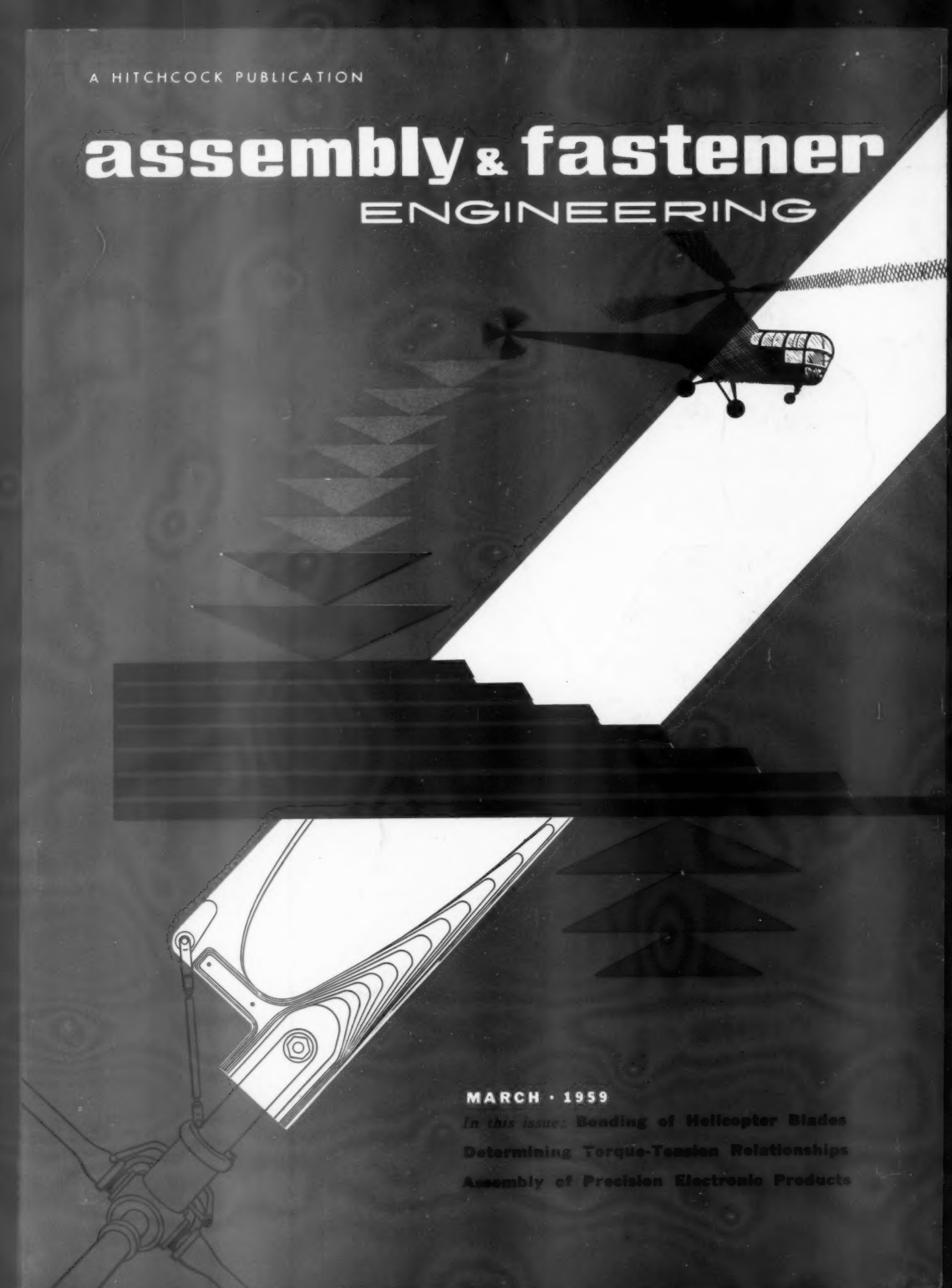
A HITCHCOCK PUBLICATION

assembly & fastener ENGINEERING



MARCH · 1959

In this issue: **Bonding of Helicopter Blades**
Determining Torque-Tension Relationships
Assembly of Precision Electronic Products

Product . . . problem . . . pre-assembly!

This man is solving a fastener problem

the **Pheoll** *way!*

The ability of the Pheoll sales engineer to cut manufacturers' production costs with quickly-installed *pre-assembled* fasteners is the direct result of two Pheoll resources. The *first* is equipment . . . Pheoll's flexible "specials" and automated assembly equipment that makes possible economical mass production of precision-engineered, pre-assembled fasteners exactly right for your needs. The *second* is the skill, ingenuity and willingness to *TRY* that Pheoll sales engineers—and all members of the Pheoll "specials" team—bring to every fastener problem. Why not turn *your* problem over to them—today. Simply give the details to your Pheoll field representative.

THE MAN IN THE PHOTOGRAPH *is* a Pheoll sales engineer . . . Vince Adamski, veteran of 14 years in production design!

Pheoll Manufacturing Company

Industrial Fastener Division

5700 WEST ROOSEVELT ROAD

CHICAGO 50, ILLINOIS

assembly & fastener ENGINEERING

March, 1959 Volume 1, Number 6

EDITORIAL STAFF

William F. Schleicher
VP and editorial director

Matt E. Heuertz
Managing editor

Darrell Ward
Engineering editor

Ray H. Smith
Assistant editor

William D. Engstrand
West coast editor

P. L. Gibbons
Reader's service

Vic Erickson
Editorial art director

BUSINESS STAFF

Robert C. Van Kampen
President

Vincent C. Hogren
Executive vice president

J. E. Hitchcock
Vice president

Oliver S. Pepper
Business manager

John S. Todd
Production manager

D. L. Campbell
Adv. production manager

Gene West
Fulfillment manager

Robert L. Spreckels
Circulation manager

Ray Sietsema
Director of research

Bruce B. Howat
Marketing director

L. M. Schroeder
Adv. art director

FEATURES

The Stock Market's Future 7

Experts at Merrill Lynch look at today's market in light of the recession and the coming boom.

Adhesive Bonding of Helicopter Blades 22

The root-end of metal rotor blades are built-up by adhesive bonding at the Parsons Corporation.

How to Determine Torque-Tension Relationships 26

Double-function instruments can accurately determine the tensile strength of threaded fasteners as well as calibrate an impact wrench to induce this tension.

Assembly of Precision Electronic Products 30

LearCal, a major supplier to the aircraft industry, minimizes assembly problems peculiar to precision products.

Sliding Fixtures Aid Camera Assembly 35

Setting rivet-nuts and rivets in Ansco's Clipper color model is a safe, easy task with special sliding fixtures.

The Fastening of Light Metals 39

Locking action of fastener with a wider load-carrying root improves under loads imposed by vibration, tension and heat.

DEPARTMENTS

2 **Letters to the Editor**
5 **The Editor's View**
8 **Business Notes**
11 **Industry at Work**
15 **Assembly & Fastening Ideas**
19 **Reports from the Field**
43 **What's New in Equipment**
51 **What's New in Fasteners**
57 **Useful Literature**
61 **Industry Makes News**
72 **One Last Word**

Subscription rates: $6.00 per year in U.S.A. $7.50 per year elsewhere.

Copyright 1959, by Hitchcock Publishing Co., Wheaton, Ill. Phone MO 5-1000. Cable address: HITCHPUB.

Accepted as controlled circulation publication at Pontiac, Illinois.

• Whirling helicopter rotor blades exert a tremendous centrifugal pull against the root end coupling. An ideal method for distributing this load over a large area of the thin aluminum skin is by use of adhesive bonded laminations. See page 22 for details.

BEFORE...
Separate Bolts, Nuts and Washers complicate inventories, increase assembly costs.
AFTER...
Washers as integral parts of bolts and nuts eliminate problems, speed assembly at lower cost.

Save Money

by simplifying fastener design

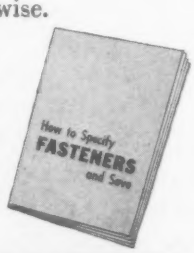
Here is a simple application of a basic bolt making principle which is affecting substantial savings for a number of manufacturers.

These savings, resulting from simplified design, are realized in every step of the operation from lower first cost of the fasteners through inventory to final assembly. Totalled, they are well worth while.

There are many other basic principles . . . often overlooked in designing and specifying fasteners, which are of importance cost-wise.

You'll find them in our new booklet, "How to specify fasteners . . . and save". Filled with drawings and charts, it makes a handy guide in designing or buying any headed parts.

If you can use a copy, write to North Tonawanda or ask a Field Representative.



BUFFALO BOLT COMPANY

Division of Buffalo-Eclipse Corporation

North Tonawanda, N.Y. • Princeton, Illinois

MAKING BOTH FASTENERS AND FRIENDS FOR 100 YEARS

● *3 convenient service centers*

WESTERN OFFICE Chicago HArrison 7-2178 | **EASTERN OFFICE** New York City REctor 2-1888 | **CENTRAL OFFICE** North Tonawanda JAckson 2400 (Buffalo)

Use postpaid card. Circle No. 201

Letters to the Editor

Tensile Area of Threads

The article in December on "The Tensile Area of Threads" was read very closely, and was much appreciated. Mr. Schlarman exposes some of the design computation fog in the fastener field.

Harry Conn
Chief Engineer
Scully-Jones & Co.
Chicago, Illinois

Who If Not You?

The excellent editorials in the January issue were, I believe, both interrelated and timely. I intend to blend them with a few thoughts of my own into a talk for our Toastmasters Club in the near future.

Please send me a reprint of each, and a couple of the "Who-When" cards.

J. A. Parke
Power Plant Design
Bell Helicopter Corp.
Fort Worth, Texas

The subject matter of the "One Last Word" is of vital importance to all in the field of engineering and production.

Being in full agreement with everything you said, I should like to join you in hanging above my desk the sign, "Who If Not You? When, If Not Now?"

J. C. Nyoz, Sec. Mgr.
Instrument Engineering
Westinghouse Electric Corp.
Newark, New Jersey

Accepting your offer, I am requesting a number of your cards. . . . This is without doubt the last word in human efficiency.

R. Williamson
Project Admin. Asst.
Food Machinery & Chemical Corp.
San Jose, California

Rivet Applications

In a feature article on rivet applications in January, reference is made to compression or cutlery rivets comprised of male and female pairs. . . . Please advise the names of manufacturers of this type of rivet.

W. H. Held
Elec. Control Section
Electro-Motive Division
General Motors Corp.
LaGrange, Illinois

ROSÁN INC.

Designers and Manufacturers of the World's Finest Precision Fasteners

• SHEET METAL FASTENERS • HYDRAULIC FASTENERS • ELECTRONIC FASTENERS
• ARMAMENT & MECHANICAL COMPONENTS • ELECTRONIC COMPONENTS

THE NEW ROSAN FLOATING PRESS NUT . . . .

. . . . a really significant answer to panel fastening problems. The .030" float, together with reduced space requirements and the functional features which provide maximum resistance to push-out and torque-out, without question, simplify design considerations. The Floating Press Nut can be used in material having a minimum thickness of .045".

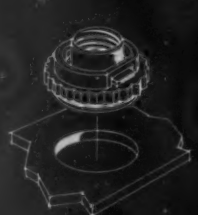
The installation procedure is simple — just punch or drill one hole and press the part in place.

Specify Rosán Floating Press Nuts for your new designs and derive these advantages:

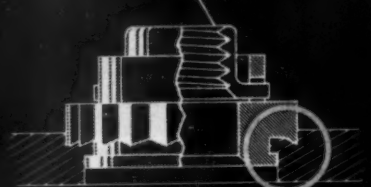
- *Lighter weight*
- *Compact — with .030" float*
- *Maximum resistance to push-out*
- *Maximum resistance to torque-out*
- *Greatly reduced tooling costs*
- *Cheaper and faster installation*
- *Elimination of rivets*

The floating press nut is available in sizes #4 thru ¼" with the internal thread locking feature to Specification MIL-N-25027 (ASG).

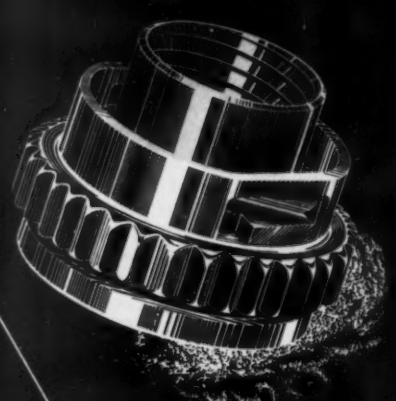
TYPICAL
#10 PLATE NUT INSTALLATION



ROSAN
#10 FLOATING PRESS NUT



INSTALLED FLOATING PRESS NUT
#10 3 x actual size

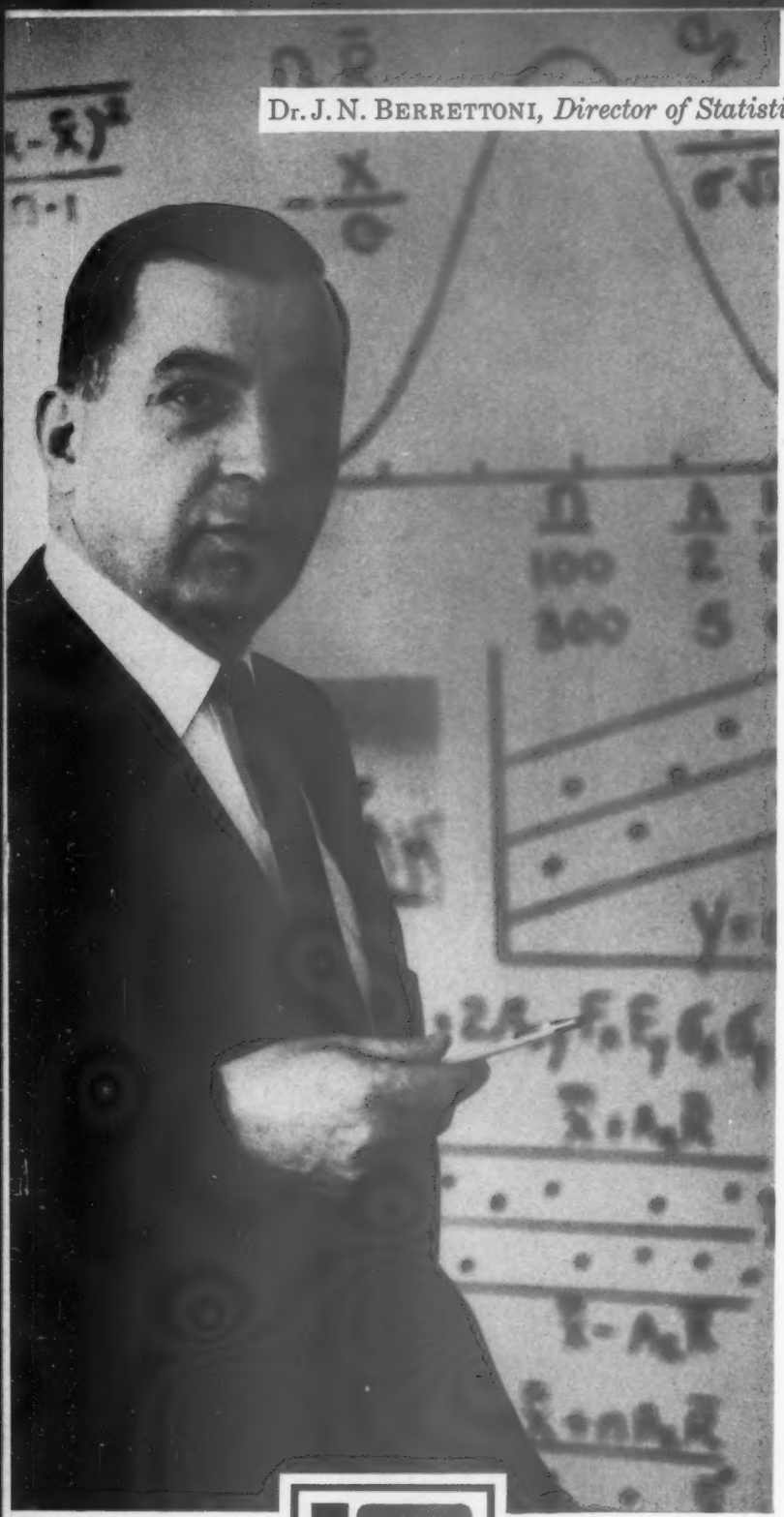


ROSAN INCORPORATED • 2901 WEST COAST HIGHWAY • NEWPORT BEACH, CALIFORNIA

Branch Offices: CHICAGO • DAYTON • DETROIT • NEWARK • FT. WORTH • WASHINGTON, D.C.
In Great Britain: INSTRUMENT SCREW CO., LTD.

ROSAN INC. 10th ANNIVERSARY

U.S.A. AND FOREIGN PATENTS GRANTED AND PENDING. COPYRIGHT 1958 ROSAN INC.



Dr. J. N. BERRETTONI, *Director of Statistical Quality Control, asks...*

What's your fastener AQL?

Here are important keys to obtaining *guaranteed fastener quality* to meet your specific needs.

Careful evaluation of print tolerances is the first step. This means placing each dimension into a critical, major or minor category. For example, a major category may be one where only one dimension in a hundred is allowed to be out-of-tolerance. This 1% then becomes the Accepted Quality Level (AQL). The same type of evaluation is applied to physical and chemical characteristics, plating requirements.

Clear definition of your quality levels can also help reduce your costs. Example: recent quality evaluation of a special fastener showed that, out of a total of twelve dimensions, only two were "majors". Why pay for twelve major dimensions when only two are really essential?

L & S quality level guarantees, evidenced by written certifications, are based on the extensive use of statistical quality control methods. We use MIL-STD-105A, MIL-STD-414, and Dodge and Romig tables to certify incoming raw material and outgoing finished product. For process certification, quality control methods and charts of Dr. W. A. Shewhart are employed at every stage of manufacturing.

Take advantage of this strict L & S Quality Control to cut your receiving and in-process inspection costs.

L & S Fastener Engineering helps you "tighten up" on...

- **PURCHASING COSTS**
- **INSPECTION AND HANDLING COSTS**
- **ASSEMBLY COSTS**

LAMSON & SESSIONS

5000 TIEDEMAN ROAD • CLEVELAND, OHIO

Plants in Cleveland and Kent, Ohio • Chicago and Birmingham

Use postpaid card. Circle No. 203

MARCH, 1959 VOL. 1, NO. 6

THE PAYOFF OF LIFETIME RELIABILITY

Several years ago when a slump in appliance sales was causing serious concern, many marginal producers, as well as some big name companies, were forced from the field.

Marketing experts suggested that the cure for lagging sales was planned obsolescence. They chided the leaders in the industry for designing their appliances to last a lifetime. Some manufacturers would have welcomed a program for obsoleting appliances every few years but not those whose names had become a household word for reliability. The leaders knew that their reputation was built on reliability, and anything less would be detrimental to themselves as well as the industry.

Still we have a staggering bill for service and repair of appliances which is running somewhere in the neighborhood of $16 billion a year. Whose brands are responsible for this? Are these faulty appliances the products of companies already forced out of the field, or marginal producers still trying to survive, or even some big name companies whose management is not completely sold on lifetime reliability?

From personal experience I would say that those companies (large or small) which believe in building products designed to last a lifetime are responsible for only a small percent of that $16 billion service bill.

It was twelve years ago that I made my first editorial contacts with companies in the appliance industry, and in the years since have come to know which companies try to design lifetime reliability in their products. These were the companies from which my family would choose our home appliances.

First we bought a washing machine, then a refrigerator, range, toaster, vacuum cleaner, food mixer, and recently a floor polisher—and no two appliances have the same brand name.

We have never had a service call on any of these personally selected appliances. This has been partly a matter of luck, but this luck had the insurance of selective buying.

Most important, however, is the fact that none of the seven companies have passed from the scene. As a matter of fact their reputation has been enhanced, and several of them had their highest sales in 1958.

With the consumer confronted with continually rising prices, and more and higher taxes in face of a declining dollar, he is being forced to closely scrutinize every major outlay of his hard-earned cash. And the companies which have built and maintained their reputation through the years are now being rewarded with their deserved share of the consumer's dollar.

Matt E. Hensley

Managing Editor

Another Tinnerman Original...

Cost-cutting Tubular **SPEED CLIP®** takes positive "bite" to hold assemblies tight!

In seconds, you can front-mount trim, name plates, grilles, knobs, insulation, with Tubular SPEED CLIPS. And at interesting savings in assembly time and costs!

Snap these quality spring-steel fasteners into holes in metal, plastic or wood. Then press the mounting studs, nails or rivets into the clips to complete the attachments... anywhere along your assembly line.

As the SPEED CLIP is inserted, spring fingers compress, then expand behind the panel to lock tight. The rolled-in end permits easy entrance, but bites hard into the stud to prevent back-off or vibration-loosening.

Tubular SPEED CLIPS are available for a full range of stud sizes and panel thicknesses. Permanent lock or removable types.

Check your Sweet's Product Design File (Section 8/Ti) for data on Tubular SPEED CLIPS and other SPEED NUT brand fasteners. Then call your Tinnerman representative for samples and additional information. If he isn't listed under "Fasteners" in your Yellow Pages, write to:

TINNERMAN PRODUCTS, INC.
Dept. 12 • P. O. Box 6688 • Cleveland 1, Ohio

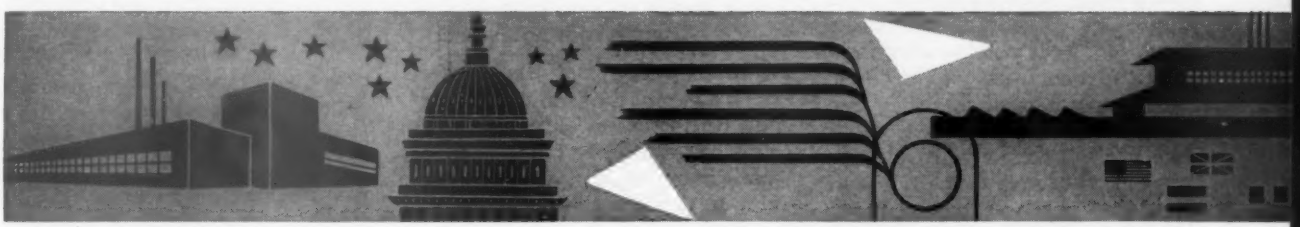
TINNERMAN
Speed Nuts®

FASTEST THING IN FASTENINGS®

CANADA: Dominion Fasteners Ltd., Hamilton, Ontario. GREAT BRITAIN: Simmonds Aerocessories Ltd., Treforest, Wales. FRANCE: Simmonds S. A., 3 rue Salomon de Rothschild, Suresnes (Seine). GERMANY: Mecano-Bundy GmbH, Heidelberg.

Use postpaid card. Circle No. 204

The State of Business



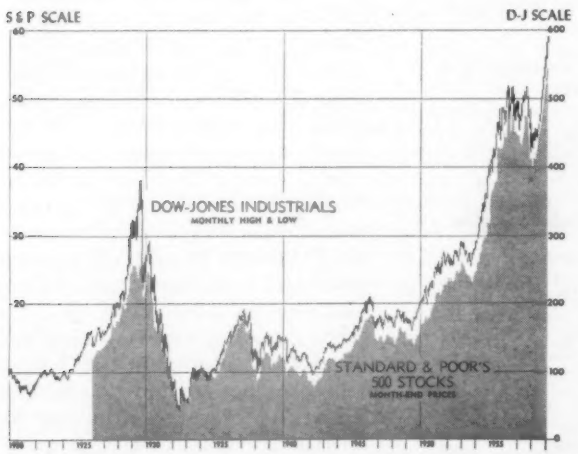
THE STOCK MARKET'S FUTURE

by **Merrill Lynch, Pierce, Fenner & Smith**

Compared with the gloom of a year ago, sentiment today is exuberant. Can the market continue the almost straight-line advance of the past nine months? Will inflation continue to warp people's idea about savings habits? What about bonds? Will the golden '60's be discounted by the time 1960 arrives? What bugs, if any, are there in the picture?

Since the early post-war years the stock market has rolled steadily higher. There were pauses in 1953-54 and again in 1956-57 but each time stocks recovered and rose to new peaks. In January 1959 the Dow-Jones industrial average was close to 600, more than three times the 1946 level of 175.

Behind this rise are three fundamental factors: 1) the continued growth of American business with rising profits and increased dividends; 2) the growing awareness of inflation on the part of our citizens; 3) millions of new stock owners who seek to protect part of their capital and their future through investment in common stocks. In 1948 the Federal Reserve Board stated there were 4,800,000 stockholders in the country; today the figure is put at 10,000,000—which does not include millions of others who have an indirect interest in common stocks via pension funds, life insurance, savings accounts and the like.



Both the Dow-Jones and Standard & Poor's measurements reveal the same basic trends in the stock market over the years. During the last week of 1958, the Big Board listed its 5 billionth share and the industrials rushed past the former all-time high of 521 of April, 1956.

Inflation, like the genie once out of the bottle, is difficult to control. More people have become "educated" to the meaning of inflation. The only way to protect capital, the thinking goes, is to hold good stocks; even if these stocks rise, do not sell them; institutions, for example, are relentlessly accumulating the good issue, thus causing shortages of quality stocks; high capital gains taxes must also be considered. Bonds, as one commentator said, are "certificates for guaranteed confiscation." This point of view has merit but sounds too simple to accept blindly and we think there will come a time when a balanced portfolio will again stand the investor in good stead.

Business has recovered smartly, appears to have leveled out a bit, but still has further to go in both time and intensity before reaching boom proportions. Bank loans so far have not expanded sharply. Business profits are recovering brilliantly and the U.S. Treasury is taking the optimistic view that corporate earnings may rise to $48 billion in 1959 compared to $36 billion for 1958. Rising earnings should be a powerful support to stock prices during the first half of '59.

Increased labor productivity is given much credit for this earnings improvement. It is to be hoped that labor will remember the many billions which corporations have spent to achieve the economist's dream of helping to increase productivity per man. It would be unfortunate if labor forgot management's efforts in cost-cutting programs and demanded too large a slice of the pie in the form of unreasonable wage demands. The consumer received mighty little in the form of price reductions during the brief recession and he might rebel at higher prices. If negotiations of steel wages this summer should result in

continued

another wage-price inflationary spiral with increased borrowing all around, there would be cause for serious worry. Why?

First, the Federal Reserve would have the obligation to restrain the boom, and the Fed has always been successful, even though it sometimes has taken time. Money is not too easy right now and a borrowing spree would force money rates higher than anything seen in years. Bond yields might reach attractive levels that some institutions in their new securities purchases could decide to place more emphasis on the bond market than on the stock market.

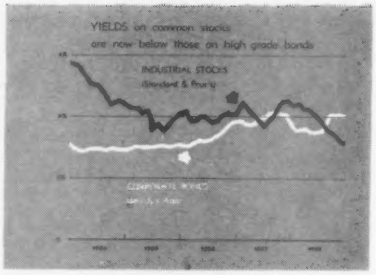
Secondly, a wage-price spiral would affect our ability to compete in world markets. There has been much discussion of the European Common Market. The recent decision of 10 nations with respect to free convertibility of currencies could not have been made if these countries had not renounced inflation as a way of life, at least for the present.

Even France has initiated an anti-inflationary policy. Of greater importance was Britain's decision in the summer of 1957 to resort to a 7% re-discount rate at the Bank of England to fight inflation and build foreign reserves. As the world's short term banker, Britain's recent convertibility moves reflect strength and confidence.

America has not shown the same awareness of inflation's serious consequences. Further price rises here would be unfortunate—many of our world competitors are now in position to give us a real battle in international markets.

To sum up, stocks are in an area where risks are higher than they have been for years. Stock prices seem high at 20 or more times 1958 earnings. Earnings this year will rise sharply so that price relationships will improve, but not substantially so.

Technical market action is not now quite as strong as it was during the summer and fall of last year but the degree of change can be classed as moderate and possibly preliminary, rather than advanced and dangerous.



The stock price trend will probably continue selectively higher but we would expect more frequent and sometimes severe setbacks to interrupt the upward climb. Bond yields are now higher than on most quality stocks.

Tax exempts compare particularly well for investors in higher income tax brackets. If business blossoms forth into a boom, bond yields could become even more attractive. A point may be reached later where bonds should constitute an increasingly important part of an investor's portfolio. •

Notes in the News: January production of 145%, based on 1947-49 average, was only two points off August 1957 peak . . . Steel is operating between 85-87% of capacity . . . Wage increases in Southern textile mills are being passed on to consumer at 2-5% pace . . . Bills to raise Federal minimum wage to $1.25 for retail and wholesale workers have been introduced . . . Mortgage delinquencies rose to a not-dangerous 2.33% in '58 from 2.15% in '57 . . . Court hearings have begun to decide if DuPont must liquidate its 23% ($3 billion) holdings of GM stock to comply with Supreme Court anti-trust ruling . . . Railroads, armed by Transportation Act of 1958 allowing right to meet competitors freight rates, are battling truckers by offering guaranteed rates for large shippers. Carloadings up 3-6% over '58 . . . Small car sales could top 1 million in '59 (17% of market), including late introduction of models by Big Three . . . Platinum prices up $5 an ounce to $60 . . . FTC is questioning 1000 food retailers about concentration of power in industry.

LATEST INDUSTRY STOCK RATINGS BY MERRILL LYNCH

Relatively Favorable

Airlines
Drugs—Ethical
Drugs—Proprietary
Electronics—Civilian
Electronics—Defense
Fire-Casualty Insurance
Natural Gas—Distributors
Office Equipment
Paper Containers
Paper Producers, Diversified
Railroads-Eastern
Railroads—Southern
Railroads—Western

Average

Agricultural Machinery
Air Conditioning
Aircraft Manufacturers
Aluminum
Apparel Chains
Auto Finance
Automobile Accessories
Banks
Canning
Carpets
Cement
Chemicals
Cigarettes
Cigars
Coal (Bituminous)
Construction Machinery
Containers——Glass
Containers—Metal
Copper
Department Stores
Drug Chains
Electrical Equipment
Fertilizer
Food Chains
Hard Floor Coverings
Heavy Machinery
Lead & Zinc
Liquor
Mail Order Chains
Meat Packing
Metal Fabricating
Natural Gas—Integrated Systems
Natural Gas—Pipelines
Oil Field Equipment
Paper Makers
Petroleum
Plumbing & Heating
Railroad Equipment
Railroads—Coal Roads
Rayon
Roofing & Wallboard
Rubber
Small Loan
Smaller Passenger Car Producers
Soap
Steel
Sugar—Cuban Cane
Sugar—P.R. Cane
Sulphur Producers
Textiles
Truck Manufacturers
Utilities—Communications
Utilities—Electric Operating
Utilities—Integrated Holding
Variety Chains

Relatively Unfavorable

Beer
Biscuits
Bread Baking
Candy
Chewing Gum
Corn Refining
Dairy
Machine Tools
Milling
Motion Picture Producers
Motion Picture Theatres
Packaged Foods
Snuff
Soft Drinks
Sugar—Beet Sugar Processors
Vegetable Oil

NOW 200 NEW IR AIR TOOLS

to help you cut fastener costs and increase output!

assembly machines

The ultimate in fastener and assembly efficiency —whether it's to automate a single nut running operation or a complete assembly line.

Screw driver with automatic feed for one or more screws—readily adjustable for various screw spacings.

screw drivers

More than 94 new sizes and models featuring instant push button reverse, renewable trigger bushing, wider operating range, more power and more accurate control.

Self-sealing rubber faced throttle valve simplifies maintenance.

ratchet wrenches

Designed for close quarter nut running, these wrenches combine the powerful "Multi-Vane" air motor with a simple, efficient ratcheting mechanism.

Like all I-R ratchet wrenches, Model 001JW can be used for removing nuts, by simply turning tool over.

angle wrenches (torque control)

Adoption of these new Torque Control Angle Wrenches expands I-R's line, making it the most complete on the market. Unique feature is automatic torque control valve which shuts off air to the motor when nut is run to pre-determined torque.

Built in torque control is a feature of this I-R size 38PT. Torque ratings range from 5 to 100 ft. lbs.

impactools (torque control)

Revolutionary new Torsion Bar Torque Control provides control never before possible. Basic principle is I-R's time-tested, exclusive ball and cam impact mechanism.

Speed and flexibility of famous I-R impactool is combined with maximum torque control in this Model 5040T.

Easiest way for you to cut production costs and increase man-hour output is with new, more efficient air tools. Tools shown here are representative of the more than 200 new, more productive tools added to the I-R line in the past two years. Power increases ranging up to 75% help to cut costs on fastening operations.

For detailed information about the complete I-R line of cost-cutting Air Tools—call or write your nearby I-R office.

8-880

Ingersoll-Rand

Tools plus AIRengineering increase output per man

Use postpaid card. Circle No. 205

If you use locating dowels, hinge pins, rivets, set screws . . . or straight, knurled, tapered or cotter-type pins—you should look into the savings in time and money offered by the Rollpin formula. **(1)** You start with a straight production-drilled hole—no threading, peening or precision drilling is needed. (For example: permissible and typical hole tolerances for effective Rollpin installation are .125-.129 for the ⅛" diameter pin; .250-.256 for the ¼" pin.) **(2)** You need no more than a hammer . . . simply modified hand tooling, arbor press or hydraulic press to set the Rollpin into a secure, vibration-proof fit. **(3)** You just drive the Rollpin into the hole . . . and that's it. Spring action locks the Rollpin in place...regardless of impact loading, stress reversals or severe vibration. Yet it is easily drifted out . . . and can be reused in the same hole. For information on how Rollpin can simplify your fastening jobs, fill in and mail coupon below.

ROLLPIN®

ESNA®

A PRODUCT OF

ELASTIC STOP NUT CORPORATION OF AMERICA

Elastic Stop Nut Corporation of America
Dept. R56-397, 2330 Vauxhall Road, Union, New Jersey

Please send the following free product information:

- ☐ Rollpin dimensional data
- ☐ Rollpin installation suggestions
- ☐ Here is drawing of our product. What self-locking fastener would you suggest?

Name_____ Title_____

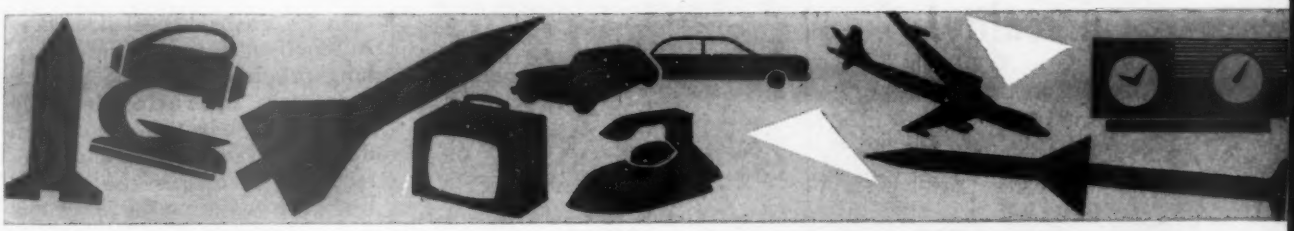
Firm_____

Street_____

City_____ Zone____ State_____

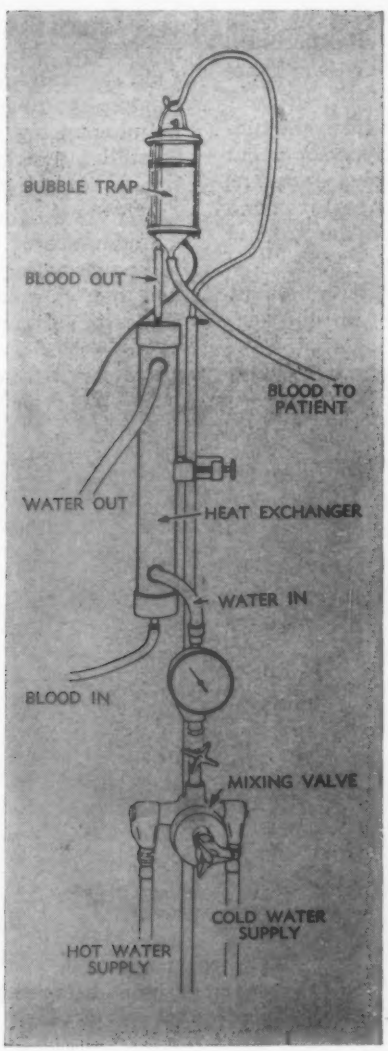
Use postpaid card. Circle No. 206

Industry at Work



HYPOTHERMIA! STEEL TUBING PLAYS BIG ROLE IN HEART SURGERY

Stainless steel heat exchanger is part of the artificial heart-lung circuit used during open heart surgery to lower body temperature.



Small, thin-wall stainless steel tubing, made with a specially smooth inner diameter, is helping to cheat death in delicate open heart surgery.

Produced by Superior Tube Company, Norristown, Pa., the tubing is used in a unique heat exchanger which lowers the temperature of blood (hypothermia) as it circulates through an artificial heart-lung machine. By reducing the patient's temperature, thus cutting his oxygen requirements, lower flow rates are permitted through the heart and lungs while still protecting the brain and other vital organs.

The blood heat exchanger was developed by Harrison Radiator Division of General Motors Corporation, Lockport, New York, in cooperation with Duke University Medical Center, Durham, N.C.

Harrison Radiator project engineers had to start from scratch, applying basic engineering knowledge to the design of a highly engineered product used in a non-engineering field. Approximately two months of calculations were required.

One of the most important decisions was choice of the type of tubing for the exchanger. The tubing cluster—24 tubes mounted inside a steel jacket—is the backbone of the heat exchanger. Blood flows through these tubes and is cooled (and then warmed after the operation is over) by a parallel flow of water in the surrounding jacket.

Blood is sensitive. Contamination by corrosion products in the tubing could be extremely serious. This required a tubing material which would be inert to attack by chemicals in the blood. The tubing also had to have a very smooth inside surface to prevent possible rupture of the cellular elements in the blood as it flows through the tube.

It was found that type 304 stainless steel tubing with a highly polished inside surface was ideal. Tubing in the size needed (.210" outer diameter with

continued

BARTITE SEALING WASHERS

make leakproofing a reality!

1 SEALS UP BETWEEN FASTENER HEAD AND WASHER

2 SEALS OUT BETWEEN WASHER AND MATERIAL

3 SEALS DOWN BETWEEN HOLE AND THREAD

A revolutionary new type of washer with sealing compound adhered to the underside . . . makes any threaded fastener completely leakproof against liquids or vapors.

The washer is partially dome-shaped with flattened perimeter which makes smooth, even contact when tightened down.

The stable, non-aging sealing compound is chemically inert, will not split or ozone-check under high pressure, withstands temperatures from −100°F. to +250°F. without change. It provides a secure seal against water, oils, acids, salts, hydrocarbons, etc. When applied to a flat or curved surface under torque the washer does not turn . . . compression of dome shape forces live sealant into 3-way seal.

BARTITE Sealing Washers are available in all standard screw or bolt sizes through ½″ dia., with a choice of metals and finishes.

If your product or building requires sealing, you can eliminate costly and troublesome rejects and repairs by assembling with BARTITE Sealing Washers, which make leakproofing a reality! Washer construction allows pre-assembly with fasteners to speed production—inquire about this feature from your regular screw supplier. Write for samples and descriptive bulletin B-10.

Bartite Products Corp.

Patents Pending U. S. A. and Foreign.

Subsidiary of L. J. BARWOOD MFG. CO., INC.
Inventors and Sole Manufacturers of Patented Metal-Clad Padded Finishing Washers
10 Williams Street, Everett 49, Mass.

Use postpaid card. Circle No. 207

Engineer Demetrio Sacca examines the weld to the header of the 24 tubes through which blood flows in the blood heat exchanger case.

.020″ wall) proved to be a standard item but two specifications an OD tolerance of plus .000″, minus .001″ (to permit close fit in a header) and extra smooth finish on the inner diameter—were specials.

Harrison Division takes the tubing—furnished by Superior in cut lengths of 15.18″, plus or minus .010″—inserts in headers and welds tight to form the core of the heat exchanger.

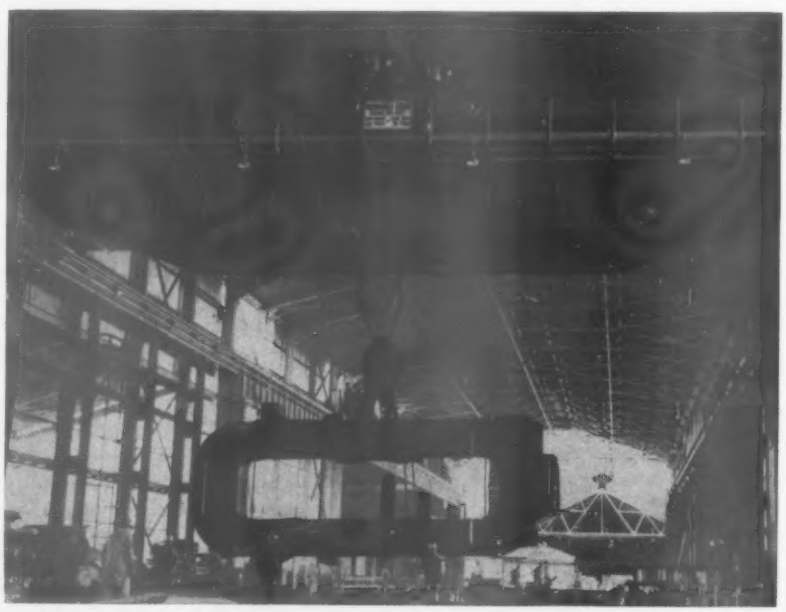
Both blood and water must flow vertically upward in the exchanger so that any bubbles that might be released by the blood will be caught in a trap at the top of the exchanger and prevented from entering the patient's blood stream. Upward flow of the water, which may be at a low rate, keeps the exchanger shell filled at all times.

In use, the blood heat exchanger is mounted between the heart-lung machine and the patient. Before the operation it safely lowers the body temperature ten degrees in five minutes and automatically maintains the desired temperature during the operation.

DEFENSE SUPPLIER TAKES COMMERCIAL CONTRACT

The recent trend of non-military manufacturing organization has been to expand into defense business. United States Chemical Milling Corp., Manhattan Beach, Calif., aircraft and missile subcontractor, has reversed this process by announcing the receipt of a $2 million contract for the production of commercial equipment.

This new contract is for the manufacture of several thousand fully-automatic, fresh brew, coffee and hot chocolate vending machines of advanced design.

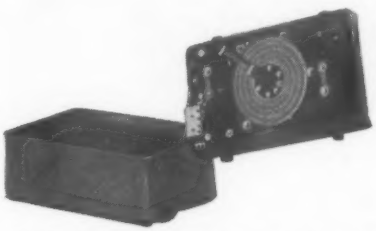


World's largest overhead aluminum crane is one being used to move 200-ton housings in Reynolds Metals' aluminum hot rolling mill in Alabama.

LOCKHEED DESIGNS SPACECRAFT RECORDER

An electronic "space memory," a tiny rugged tape recorder able to store three million pieces of scientific data as it travels through outer space, has been developed at Lockheed Missiles and Space Systems division.

Mark Siera, research scientist who developed the AMR-100, said it can store vital data of the universe during long intervals when



Capable of being held in one hand, Lockheed magnetic tape recorder is designed for space travel.

a spacecraft is out of direct radio contact with the earth and then transmit it at an accelerated rate on a command signal when the vehicle returns to within range of the earth's listening posts. It can unload its accumulated information in one-sixth the time it takes to record it.

The compact unit, weighing only eight lbs. and measuring 9" long, 5" high and 4½" wide, is one-third smaller than existing recorders with the same capacity. It can function at unlimited altitudes and in any position or axis.

It has an easily changeable cartridge containing a 600-foot endless loop tape which records two tracks of information simultaneously.

OVERHEAD CRANE MOVING 200-TON HOUSINGS

The world's largest overhead aluminum crane is being used to move 200-ton housings in the world's largest aluminum hot rolling mill, both part of the current $65 million expansion at the Reynolds Metals Company Alloys Plant near Sheffield, Ala.

The giant aluminum crane is more than 50 tons lighter than an equivalent strength steel crane. Fourteen aluminum overhead cranes are being used in the new Reynolds plant.

ALL NEW . . . through and through!

*Also available as a self-contained driving head for use in specially designed assembly machines.

The DPS model U power screwdriving machine

Manufacturing assemblies with small parts? Take note! Detroit Power Screwdriver Company announces the totally new Model U—quickly adaptable for fast, clean driving of screws, nuts and studs.

Scores of advances! An adjustable clutch designed to hold constant driving torques. A hopper drive with built-in slip control to accommodate shock loads. A feed track with quickly adjustable covers, and an escapement mechanism with positive solenoid action permitting release of screw by body or head.

A new folder, too. Write for your copy today.

DETROIT POWER SCREWDRIVER COMPANY

2815 W. Fort St. • Detroit 16, Michigan

A Subsidiary of Link-Belt Company

Use postpaid card. Circle No. 208

Take a good look at any ordinary tapping screw. See for yourself how the last thread deteriorates just under the head. That deterioration means you lose a portion of the engagement in every fastening operation. It often means slippage during final tightening—a "spinner" which must be removed and replaced. ■ With the revolutionary P-K *Hi-thred*, you get *full engagement* with the material—a bulldog grip throughout the entire length of the screw BECAUSE THE *Hi-thred* IS THREADED FULL TO THE HEAD . . . THE THREAD ACTUALLY TERMINATES IN AN ANNULAR ORIFICE IN THE HEAD ITSELF! ■ Next

time you order, ask for P-K *Hi-thred*. You get this extra measure of holding power at no increase in cost! P-K *Hi-thred* tapping screws are available in production quantities in types A or Z in non-countersunk slotted or Phillips Recessed head styles. ■ Get samples and technical data from your nearby P-K "Bulk-Stocking" Distributor. Call him today!

PARKER-KALON DIVISION

General American Transportation Corporation, Clifton, New Jersey · Offices and warehouses in Chicago and Los Angeles.

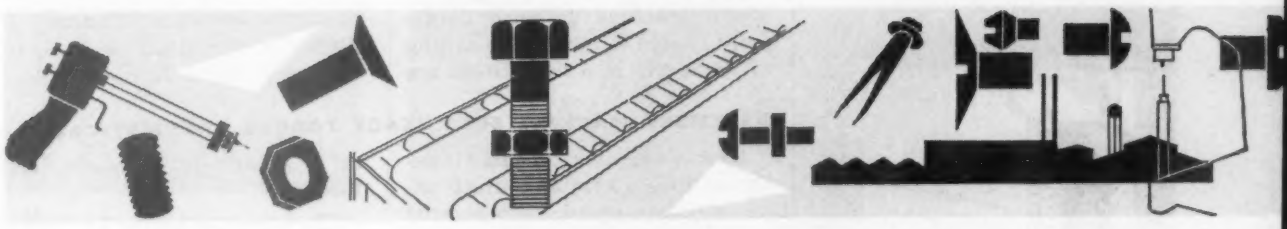
YOU GET AN EXTRA MEASURE OF HOLDING POWER WITH THE NEW P-K® Hi-Thred*

*Pat. Pending

KEEP AMERICAN INDUSTRY AT WOR -K . . . MADE IN U.S.A.

Use postpaid card. Circle No. 209

Assembly and Fastening Ideas



Temco's new brazing technique moves honeycomb panels through a gas-fired, infra-red enclosure.

BRAZING METHOD CUTS HONEYCOMB COSTS

Engineers at Temco Aircraft in Dallas, Tex. have designed a new method of fabricating brazed stainless steel honeycomb sandwich panels.

A gas-fired infra-red brazing enclosure and roller system provides a continuous process of brazing. Panels of all sizes are feasible, including single contour configuration.

Temcombing's basic premise is that if assembled sandwich materials are heated uniformly and at the same rate throughout, the assembly can run through a brazing cycle without excessive warping. Temco, finding this true, utilizes stretch-forming for smoothing the panels.

The heating element simultaneously pre-heats (1100°F) brazes (1750°F) and heat treats the component. Following brazing, the panels are stretched as required, supercooled to —100° and aged at 905° to yield the RH 950 condition.

HOLDING FIXTURE SPEEDS STUD SETTING

Many zinc alloy die castings produced by the Brown-Lipe-Chapin Division of General Motors, at its new Syracuse plant, require that threaded steel studs be driven (screwed) into tapped holes, usually in bosses on the back of the casting.

A prime requirement for such work is speed in bringing each tapped hole below the driver in a rotating spindle.

In such parts as the automobile molding (shown in photograph), work is expedited by using a simple wooden holding fixture mounted on ball casters that bear on a steel plate on the bed of the machine. Around the plate is a ledge to keep the fixture from running off the plate. This not only holds the die casting and prevents scratching on the plated surface, which is down, but also permits quick hori-

continued

HOW

to know you're getting the quality you want

Look here

for clean-well defined threads and uniform plating. Lack of either can cost you money that comes out of profit.

Look here

When you look here for these marks of quality, check a full run . . . for only the best equipment turns out quality as good on the last fastener as it was on the first. American has *both* the equipment and the attention to detail that contributes to your profit by delivering *consistent* quality.

Write today for samples of this American quality and a free stock list.

Profit Improvement Program

Quality fasteners cost more to produce . . . improve your profits when used!

Buy here

American SCREW COMPANY

Willimantic, Conn. • Detroit, Mich. • Chicago, Ill.

Use postpaid card. Circle No. 210

zontal shifting, so that the several tapped holes are brought easily in succession below the driver. Location is by hand but the operator rapidly becomes expert.

On other jobs, where the holes are in pairs and close together, a special machine designed in the plant is used for still faster setting of studs, two at a time. Studs are hopper fed into rotating grippers set to proper spacing. Jaws are loaded from the magazine in the retracted position of a crosslide. When the slide is advanced to driving position, the jaws drive the studs, spread automatically to disengage the studs and are retracted on the slide, for reloading.

ASSEMBLY MACHINE SETS EXACT TORQUE PNEUMATICALLY

Exact pneumatic torquing is designed into a machine which assembles two threaded components of an aircraft sub-assembly.

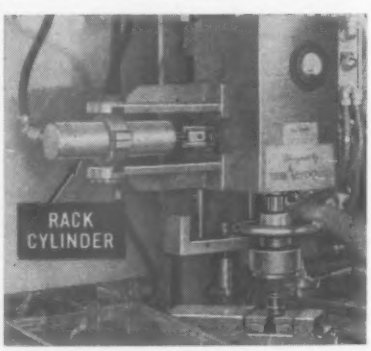
Applying a torque of 10 to 100 ft. lbs., depending on requirements, the Aeroquip machine features excellent torque repeatability. The final torque is applied by a pressure and speed controlled air cylinder driving a rack and pinion mounted to the air motor shaft, which has an overriding clutch. This method does away with all inertia and flywheel effect as it accurately simulates hand torquing.

The operator begins by loading the sub-assembly, which has been previously hand started. He actuates a start button which brings the head down into position to screw the parts together. A knee switch starts the motor.

Approaching the last few revolutions, motor speed and torque are automatically reduced, then stalled out, allowing the components to bottom well below required torque. Another hand button exhausts the air motor and operates the air cylinder, which brings the sub-assembly up to final torque.

Flexibility is possible since adjustments of air pressure and the Ross speed control valves determine the torquing force and rpm of the motor.

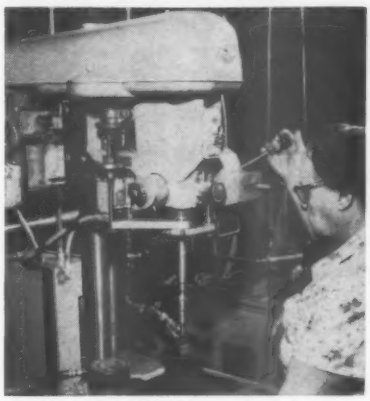
Should the air motor stall out prematurely because of a tight thread, the air cylinder will repeat its cycle automatically until the preset amount of torque has been reached.



Final torque is applied by an air cylinder driving a rack and pinion mounted to the air motor shaft.

Threaded components are assembled to exact torque, pneumatically, on this Aeroquip machine, applying between 10 and 100 ft. lbs. torque.

DRILL PRESS DOUBLES AS TAPPING MACHINE



Use of a drill press with a reversing motor for tapping is a technique deserving consideration.

The setup provides a specialized machine at one-fourth to one-half the cost of a machine designed specifically for tapping with little or no loss in productivity.

The reversing motor will provide greater capacity for a given horsepower than tapping attachments. Direct tapping facilitates the use of multiple-head accessories for tapping several holes at one—greater power requirements are more easily met with a reversing motor because there is no friction clutch and no lost power.

No special skill is required to avoid tap breakage.

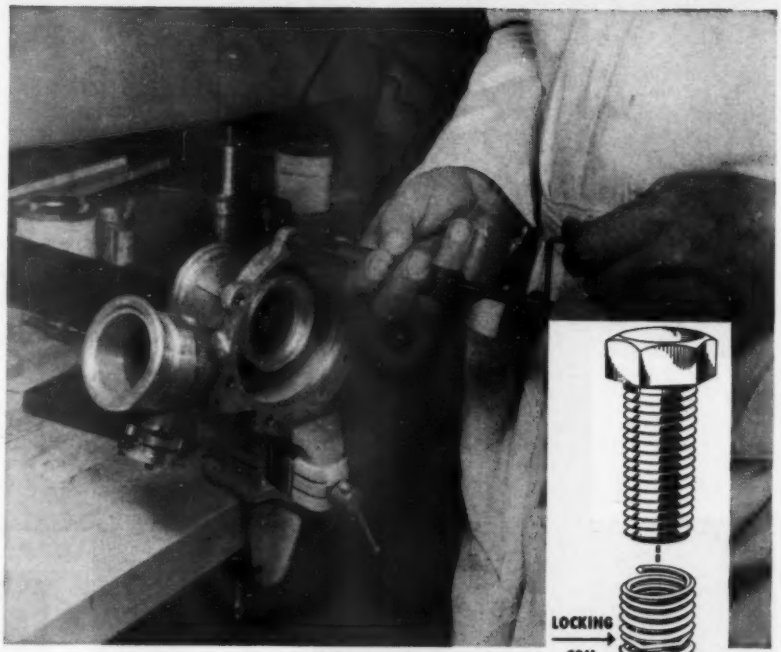
The tap provides its own lead. The life of the tap is increased because only a rotating force is applied.

Needed for the conversion are a reversing motor; control station consisting of a drill-off-tap selector switch and an emergency stop button; a tripper arm attached either to the drill press depth stop, or the quill itself, to actuate limit switches at the top and bottom of spindle travel; and a reversing magnetic starter.

Any 3-phase motor, including the standard motor supplied with Delta drill presses, may be wired for reversing.

Firms that make a kit with all materials for converting a drill press to tapping machine include: Commander Mfg.; Renco-Aire, a division of Cleveland Pneumatic; and Beckett-Harcum.

These setups have attained production rates of 500 pieces an hour.



Heli-Coil® stainless steel Screw-LOCK Insert is easily wound into tapped hole in aluminum housing. Spring tension of the locking coil retains screw securely, meets military specifications for locking torque and vibration.

How Carrier Corporation

Saves 40% in weight • 30% in assembly time

...with *HELI-COIL*® SCREW-LOCK INSERTS*

Use of aluminum makes Carrier installation lighter in Douglas DC-8 Jetliner

To reduce weight in the refrigeration system designed for air conditioning the giant Douglas DC-8 Jetliner, Carrier engineers used aluminum alloy compressor castings. To obtain maximum performance and reliability of threaded connections exposed to heat and vibration encountered at 600 mph, they selected the *Heli-Coil* stainless steel wire thread, *internal locking* Screw-LOCK Insert.

The results: design simplified, boss areas minimized, weight reduced as much as 40%, lock nuts and lock wiring eliminated. Now one man assembles the entire unit in 30% less time than before ... and danger of thread failure and screw loosening has ended!

Manufacturers in every field are relying on one-piece, stainless steel *Heli-Coil* Screw-LOCK Inserts to meet torque and vibration specs... protect threads against wear, stripping, galling and corrosion... save costs, space and weight. *Patented

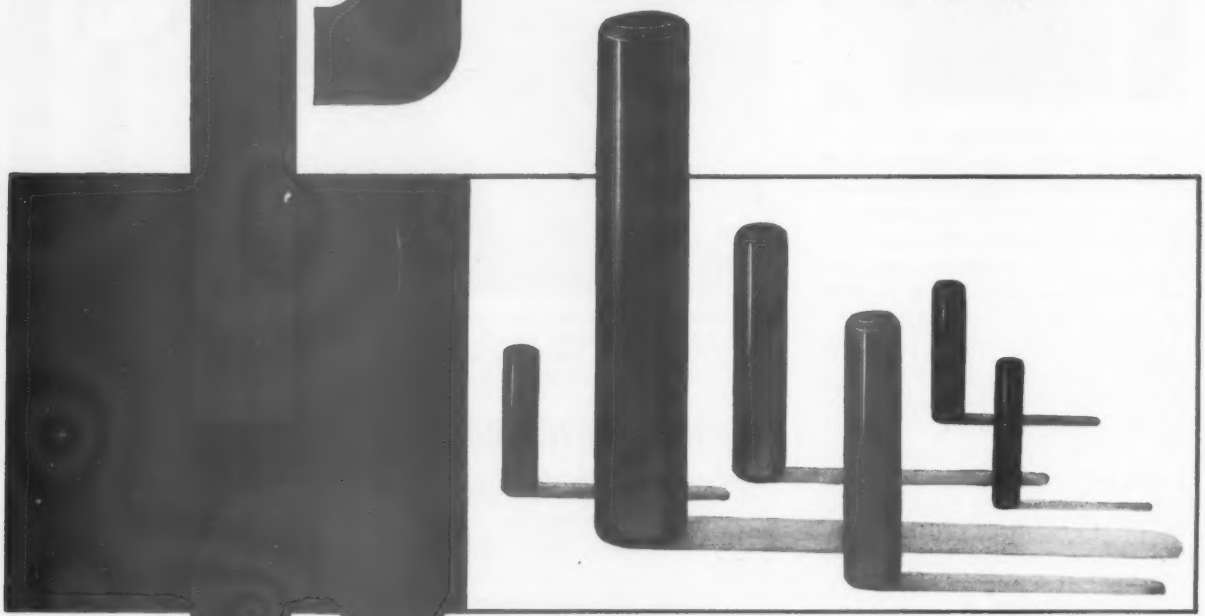
HELI-COIL CORPORATION
DANBURY, CONNECTICUT

HELI-COIL CORPORATION, 3103 Shelter Rock Lane, Danbury, Connecticut
I'd like more information on *Heli-Coil* Screw-LOCK Inserts

NAME_____ TITLE_____
FIRM_____
ADDRESS_____
CITY_____ ZONE____ STATE_____ 1959

IN CANADA: W. R. WATKINS CO., Ltd., 41 Kipling Ave., S., Toronto 18, Ont.

Problem: *"Mating parts in a machine tool fixture must be accurately positioned and held in absolute relation to each other. Fixture must absorb lateral thrusts. Must be dis-assembled and re-assembled in exact relationship . . ."*



Solution: *HOLO-KROME DOWEL PINS. Made of special analysis alloy steel with a surface hardness of 60-64 Rockwell "C" and a core hardness 50-54 Rockwell "C". Machined .0002" oversize for press fit between mating parts; .001" oversize for repair work or where holes have been machined oversize. A microinch finish of 6 RMS maximum assures accurate positioning to close tolerances. Shear strength of 150-170,000 p.s.i. absorbs side pressures and lateral thrusts without movement of parts. The famous H-K black lustre finish retards corrosion, facilitates driving.*

HOLO-KROME SOCKET SCREWS

THE HOLO-KROME SCREW CORPORATION • HARTFORD 10, CONN.

SOLD ONLY THROUGH AUTHORIZED HOLO-KROME DISTRIBUTORS

For the finest in Hex Socket Screws . . . for unmatched Same-Day Service, the name to remember is Holo-Krome.

Use postpaid card. Circle No. 212

Using new Lincoln gun, welder is splicing two flange plates for a bridge girder in universal roll-over fixture which lies flat on floor. Protrusions are run-off bars. Job takes 20 minutes.

PRODUCTION-LINE WELDING FOR LARGE BRIDGE GIRDERS

By balancing manpower, materials, operations—interjecting two special universal fixtures and combining both automatic and semi-automatic submerged arc welding techniques, The R. C. Mahon Co. of Detroit, has come up with an integrated production line system of bridge welding.

Stemming from a long-run task of producing fabricated structural steel girders for the bridges required on Ohio's new route 1, it proves that such gigantic weldments can be produced on a production-line basis.

According to J. R. Stitt, welding research director, the methods now make weldments for bridges less costly and provide high quality welding with distortion almost nil.

In brief, the production sequence starts with the splicing of flange and web plates in the splicing fixture (after cleaning), transporting the steel in order of assembly by crane to the 100-ft. assembly fixture, fitting, tack-welding; shifting again by crane to support beams for automatic welding, layout, fitting and semi-automatic welding stiffeners on both sides of the girder, trimming and preparing the girder for field erection and painting.

D. L. Buttrey, general manager of manufacturing, points out that the welding involves only 14 separate stations.

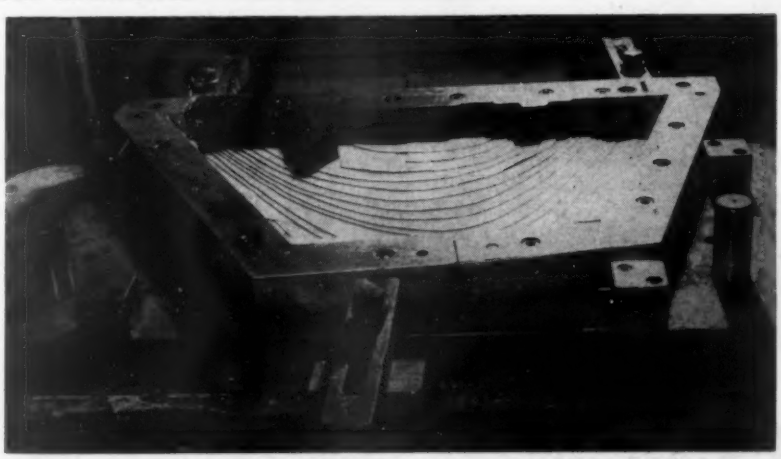
The semi-automatic arc welding operations involve the use of a new mechanized version of a manual submerged arc welding method developed by Lincoln Electric, using its ML-3 guns.

150-TON BONDING PRESS PRODUCES LAMINATED FIBERGLAS TRIMMERS

Fiberglas laminated in 150 layers and tapered in three directions enabled Chance Vought Aircraft of Dallas, Tex. to build nose control trimmers for the Regulus II missile, reducing its landing speed by the required 30 miles an hour.

The problem was to build the two-foot movable surfaces for the missile's nose with material that would not affect radio transmissions used to control the "bird" in flight. This ruled out metal trimmers. Machined fiberglas parts could not be used because split into layers in the supersonic exposed edges of the cloth would speeds of the missile.

continued



Half of the 150 pieces of fiberglas used are assembled in the press form, largest pieces on bottom and top, tapering to smallest in center.

HOW

to know you're getting the quality you want

Look here
for full top threads, so important on sheet metal tapping screws . . . and the shorter the fastener or the thinner the material, the more important full top threads become to your profit. Without that extra mark of quality, the fasteners will spin instead of tighten, cost you extra dollars out of profit to replace them. Full top threads are consistently *built* into American fasteners.
Look here for sharp points that pierce cleanly and help each fastener drive straight and true. Sharp points, like full top threads contribute to your profit picture because they eliminate the extra costs of replacing poor materials. Sharp points are another mark of *consistent* quality you get with American.
Write today for samples of this American quality and a free stock list.
Look here
Profit Improvement Program
Quality fasteners cost more to produce . . . improve your profits when used!
Buy here
American
SCREW COMPANY
Willimantic, Conn. • Detroit, Mich. • Chicago, Ill.

Use postpaid card. Circle No. 213

The problem was solved by using bonding press and 320° temperatures to produce the steerable

Nose trimmers slow up Regulus II landing speed 30 mph.

trimmers, which act like an airplane's elevators but are located in the missile's nose.

Each trimmer has knife edges on three sides and tapers to an inch thickness along the side next to the missile's skin. The thickest part contains 150 layers of fiberglas and the edges only six. To provide the smooth aerodynamic tapering required, 50 different patterns were used to cut the fiberglas cloth so that, when assembled and bonded, it would produce the proper shape.

The trimmers are recessed on the thick inboard side to take steel forgings and magnesium clamps used to link the two vanes together and move them up or down in flight. Patterns were cut in the fiberglas cloth when it was in the soft stage. Then the patterns were pre-cured to dry out excess solvents and moisture.

Largest patterns were laid in the bottom half of the die used to press them together. These tapered to the smallest patterns in the middle, then built up again to the largest on top of the pile. Dies then were pressed together and heated to 200° F. to warm up the resin and allow some of the gas between layers to vent.

After a half hour, the temperature was raised to 320° and full pressure of 150 tons applied for two and a half hours to permit the rest of the gas bubbles to escape and the resin to cure. The part was cooled under pressure and removed from the press. After inspection for flaws, it was placed in an oven at 180° F. for four hours and an additional period at 350° for post-curing. When this step was completed, the two trimmers were joined together with a steel casting "axle."

First experiments at manufacturing the trimmers saw them placed in a press exerting only 15 tons' pressure. This did not effectively eliminate the gas bubbles between layers of the cloth.

ADHESIVE SETS IN MINUTES—STRAIN GAUGES READY FOR USE

Engineers at the Tatnall Measuring Systems Co., Phoenixville, Pa. searched long for a faster, more efficient way of attaching their strain gages to test materials.

Basically an electrical circuit, the resistance of which changes under mechanical straining, strain gages are composed of a conductive network of fine wires or printed circuitry applied to a suitable backing material such as paper or plastic. They can be applied to any surface, as many as 8000 being used in testing the new Douglas DC-8 jet liner now in production.

With the advent of Eastman 910 adhesive, Tatnall, using the product for over a year, reported more

Epoxy back strain gages provide reliable information just five minutes after being attached to test material with new quick-setting adhesive.

rapid set time, versatility, easy handling and a minimum of internal stress. Where previous bonding methods required 12 to 24 hours set time, reliable readings can now be made in less than five minutes after application.

Strain gages can be attached to virtually any kind of material, with no mixing required before cementing. Because its shrinkage during curing is of a low order, minimum residual stress is built up within the adhesive film. This eliminates the necessity to put the test piece through several loadings before such stresses are relieved and accurate strain measurements can be made.

TWIN COACH DEVELOPS "BALL BONDING" PROCESS

A new technique in the bonding of aircraft components promises wide industrial applications both within and without the aircraft industry, announces John J. Lee, executive vice president of Twin Coach Co., Buffalo, N.Y.

"Ball bonding" relies on the use of aluminum balls which permits a more efficient and economical bonding of irregularly shaped parts.

First, the aircraft parts are fitted to the master layout of the assembly. They are cleaned, surface-treated and coated with liquid adhesives. A tape component of the adhesive system is applied to parts which are going to be bonded. The components are then heat-tacked to hold them together.

Before the parts are put into an autoclave to be cured, the entire assembly is laid out on metal surfaces called platens. Each platen load is covered with the metal balls. The balls, only one-quarter of an inch in diameter, are coated with a silicone based "parting" agent so that they do not stick to the bonding adhesives.

The assemblies are covered with a layer of asbestos and then an autoclave blanket which is sealed to facilitate a vacuum.

In this super-critical curing stage, bonding temperatures range from 325° F. to 350° F. with a pressure of from 45 to 200 P S I assembly. •

DIXON *Auto-Torque Driver*

Speeds Assembly and Screw Driving for Cable Clamp

2000 Hand-Fed Assemblies Per Hour—Two Parts Placed With A Single Chuck

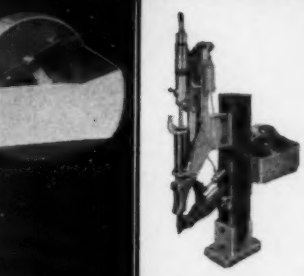
The machine shown above, which is tooled for the assembly and screw-driving work for a three-part cable clamp, is a good example of the adaptability and versatility of the DIXON *Auto-Torque* Driver (Automatic Screw Driver). Two feeders place the Phillips Head Screw and one part of the clamp in a *single* chuck with positive action. The self-tapping screw is then driven to a predetermined depth into the base part, which has been placed in the fixture by the operator.

Exclusive Design Features Provide Accurate, Dependable Operation

Many design features contribute to the over-all efficiency and dependable operation of the DIXON *Auto-Torque* Driver, which is furnished in standard models or as special arrangements. Chief among these is the positive-acting feeder with ram-action placement of the part into the chuck. This feeder is compact, with a straight track and an orienting block to avoid jams, assuring proper entry of the screw or nut into the feed track.

A built-in sensing mechanism operates automatically to stop the machine when a screw is missing or only partially driven. This assures quality control and is essential for automatic installations. The sensing feature is also of great value when driving a screw or nut to a predetermined depth without torque requirement.

Another important feature is the *Adjustable-Torque* Clutch which can be furnished in two torque ranges. It represents a new high in accuracy, ease of adjustment, and smooth operation. Accuracy is within 5% of the torque setting and it can be furnished for closer tolerances for special applications. It cannot overdrive the screws.



The standard *Auto-Torque* Driver as furnished for use as a fully automatic station. Also built as a pedestal model with foot treadle for starting the cycle.

OTHER DIXON EQUIPMENT

Auto-Positioner for small parts assembly. Furnished as automatic station or as pedestal model.

Positive-Acting Piece Parts Feeder for delivering small parts to assembly machines, presses, etc.

Parts Escapement for releasing parts singly or in multiples.

Ask for Descriptive Matter or Special Information

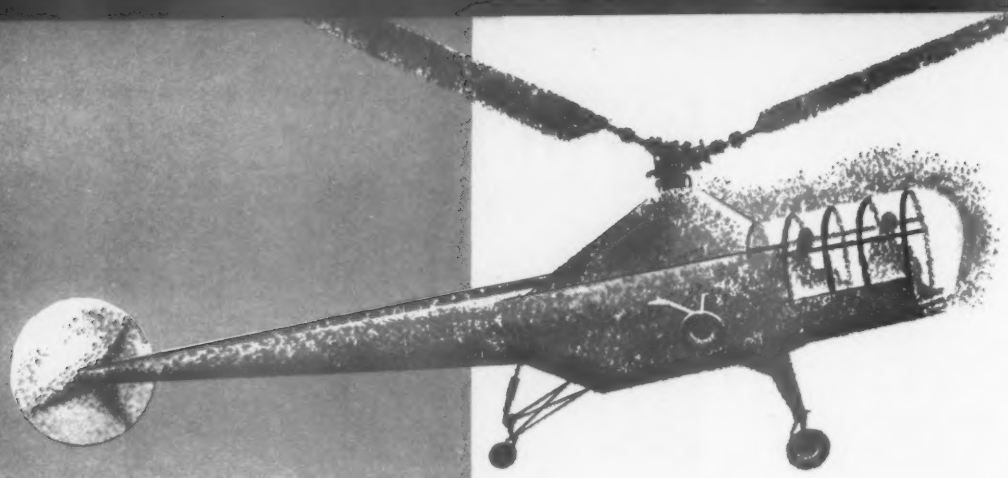
Complete information on the standard DIXON *Auto-Torque* Driver is given in Bulletin SD-B1. This and bulletins on other units are available on request. Tell us your requirements.

DIXON **DIXON AUTOMATIC TOOL, INC.**

2309-23RD AVENUE • ROCKFORD, ILLINOIS

EQUIPMENT FOR AUTOMATIC PARTS HANDLING AND ASSEMBLY

Use postpaid card. Circle No. 214



This is the root-end assembly after bonding and other operations. Root doubler and aft doubler in conjunction with the laminated assembly distributes stress loads on blade very efficiently.

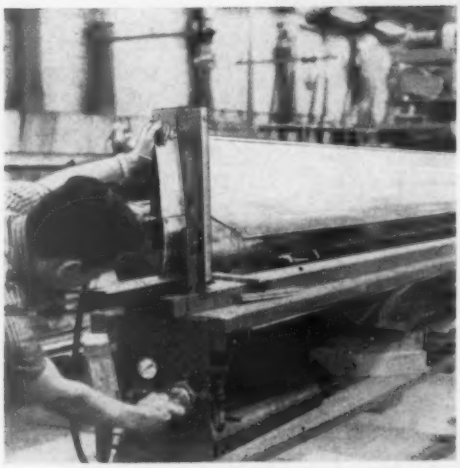
Whirling helicopter rotor blades exert a tremendous centrifugal pull against the root-end coupling. Adhesive-bonded laminations help distribute this load over a large area of the blades

BONDING OF HELICOPTER BLADES

by **Darrell Ward,** Engineering Editor

2. Spar, first channel and skins are bonded in a pressure-fixture prior to main assembly bonding in fixture shown here. All joining surfaces have been chromic acid cleaned with adhesive film applied. Here the pressure-fixture containing main assembly is readied for curing oven in background.

1. A metal blade spar, consisting of the leading edge with shear web and doubler silver-brazed together, begins first step in adhesive bonding. Economical gloves are used to protect surfaces as the unsupported sheet film adhesive is applied to the doubler. The steel part requires vapor cleaning, then priming and pre-heating to make film adhere.



3. When cooled blade is removed from bonding fixture, ends are plugged and air pressure is built up inside the blade to 4.5 psi. This makes the aluminum skin belly-out from the bonded channels somewhat like slightly corrugated sheet. If there is any defect in entire length of bond between channel and skin, the corrugated appearance would show it.

4. A special metal gage is used for locating and dry-fitting the aft doubler, one of the first built-up laminations after the basic blade construction has passed inspection. The parts are held together with quick-clamps.

When John Parsons was faced with the problem of building up laminated parts on metal helicopter rotor blades by adhesive bonding, some people said it could not be done. But this kind of reception was nothing new to the man who invented numerical controls for machine tools and saved thousands of dollars on the cost of production at crucial periods during World War II.

Adhesive bonding of metal parts to comply with specifications was not the only challenge, nor the worst that John Parsons had faced. A long and intriguing personality story lies behind all this, but, for the moment, immediate interest can be focused on the highlights of a very successful method of bonding.

The Parsons Corporation, of Traverse City, Michigan, began its activities in the aircraft field in 1943, when it initiated the manufacture of the Sikorsky R-5 helicopter rotor blades. The company is one of the oldest in the industry in adhesive bonding of primary aircraft structures. This method of assembly has been utilized at Parsons on a production basis since 1945.

Parsons routinely bonds metal to metal, wood to metal, metal to fiberglass, wood to wood, fiberglass to fiberglass, and fiberglass to wood, Most interesting of these is building up the root-end construction on metal rotor blades. Such blade construction includes adhesive bonding of steel to aluminum and aluminum to aluminum as well as the silver brazing of steel to steel.

A typical adhesive material used on the laminated metal parts is Plastilock sheet film made by Goodrich. This synthetic rubber-base phenolic material is used in pre-dimensioned rolls and tapes 0.010 to 0.012 in. thick.

Aluminum parts to be bonded are cleaned with chromic acid, either in a dip tank bath and rinse, or by "paste" cleaning at work stations.

The steel surfaces require a different approach. They are "vapor blasted" in a liquid honing machine prior to both brazing and adhesive bonding. And,

continued

because the surface of steel requires further treatment to provide proper wetability when brought into contact with the sheet film adhesive, it must be primed. The primer used at Parsons is a special formula using Plastilock No. 604 material cut with a blend of Toluene and methyl ethyl ketone.

The company is not satisfied to stand on proven materials and methods alone. Each batch of adhesive is qualified in their laboratory prior to being released for use by production personnel. Every bonding operation in the plant is duplicated on test sections, using the same batch of materials and the same time, temperature and equipment as employed on the production parts. Production assemblies and components are not released for further processing until the test specimens are checked. Results are evaluated to prove the bond of the parts.

DATA TABULATED FOR PERMANENT FILES

Comprehensive data is tabulated and computed on IBM cards for routine inspections and for permanent files. Because of their unusual IBM system, which we hope to discuss in greater detail for a future article, every batch of adhesive and every production piece using that batch can be identified in a matter of minutes.

Parsons must keep a close check on every part and every assembly that leaves the plant. When they ship a helicopter blade, they are not only conforming to basic Government regulations, they are guaranteeing the structural integrity of the rotor blade.

DESIGNING TO AVOID THE "PEEL" LOAD

More specifically, as John Parsons explained, engineering of these rotor blades for adhesive bonding methods is concerned with designing a structure to avoid peel load. In the words of people at the plant, "A good glue can be made to bond practically anything. Bonding metal is as simple as bonding many other things, but the problem is that no matter how much pressure it takes to pull apart or shear under test, they can be made to peel apart with much less pressure."

For example, a bonded joint which will have a shear strength of 3000 to 4000 psi can be made to peel at a load (expressed in pounds per linear inch) of less than 5% of the shear strength.

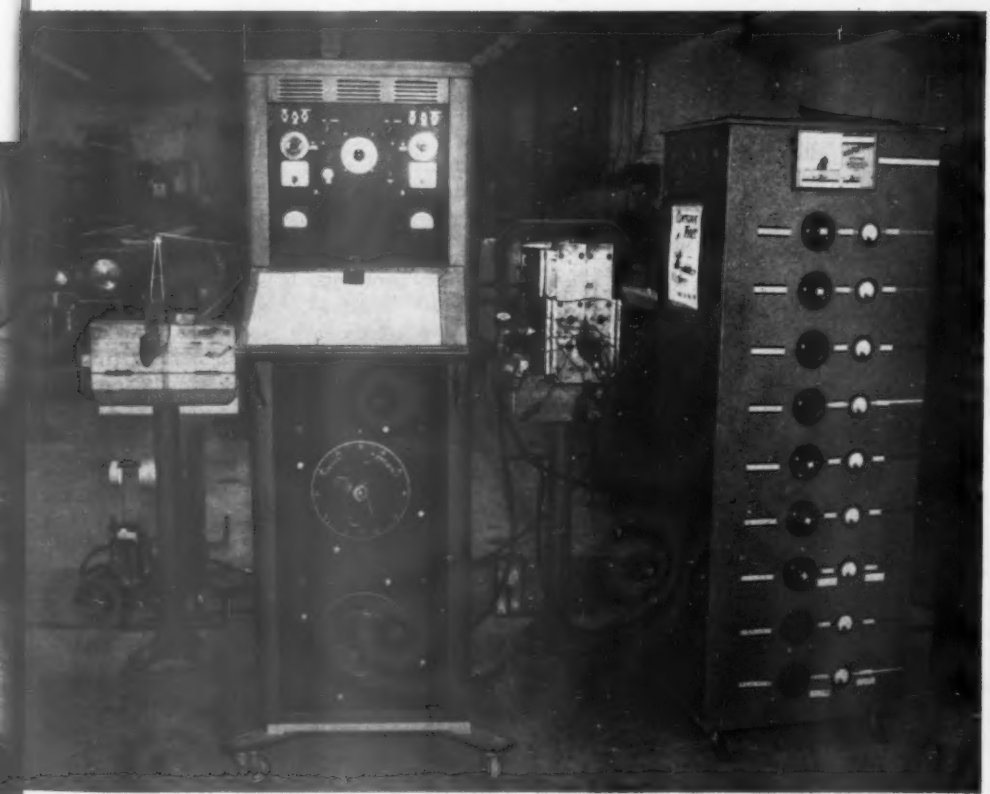
Where possible, the joint is designed so that peel loads cannot develop. However, in some instances it is necessary to use precisely placed, anti-peel rivets at key points. •

5. Drag link holes and anti-peel rivet holes are drilled with metal template and guide bushings clamped in position over the laminations. The anti-peel rivets eliminate any doubt which may occur on adhesive bonding of parts under unusual stress conditions. Bonding adhesives of various types can be peeled easier than they can be pulled or sheared apart. Rivets inserted at key points do not permit peeling to begin.

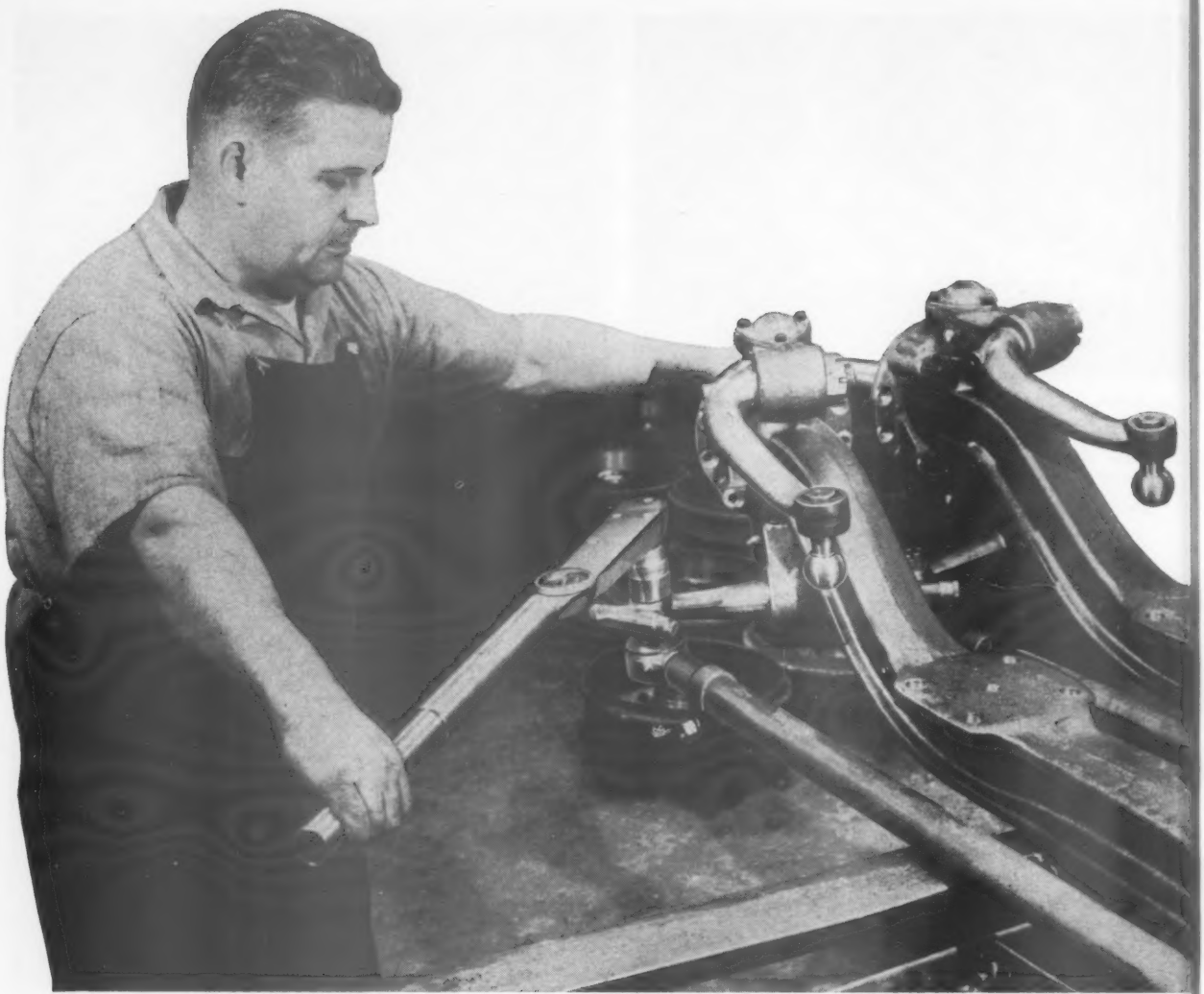
6. Red crayon is rubbed over surface of root doubler to be built up with laminations. Topmost laminate is an aluminum block which exerts uniform pressure down through the laminations and must fit contour of blade perfectly. By rubbing this block over crayon marked surface, high spots can be readily detected and ground off the aluminum block with an abrasive disc as shown here.

7. Here is a complete set of aluminum sheet laminates which bond between the aluminum block and blade skin to make root-end assembly of finished rotor blade. These parts have been cleaned in chromic acid. The laminates are pre-heated in oven to a controlled temperature of 130 deg. Worker, taking one part at a time from the oven, lays up the film adhesive on one side of each. Once the adhesive film is secured to a laminate, the surplus is trimmed to conform to the laminate profile.

8. Building the root-end doubler is a rather complex operation in this fixture. Laminations are located and stacked in sequence with thermocouples laid in at key points. Assembly consists of 12 laminations on each side of blade, covered with a Teflon blanket. A resistance-type heat blanket goes on top of the Teflon used merely to separate heat blanket from adhesive squeeze-out. Then comes a silastic rubber pressure equalizing pad, an air pressure bag, and pressure retaining plate. The air bag is brought up to 140 psi after the two-sided assembly fixture is clamped.



9. These control units are connected with the thermocouples and heat blankets in the bonding fixture. The unit at left is equipped with a thermo-selector switch for selectively reading temperatures on each of the 12 thermocouples in the assembly. These are individually regulated to give uniform heat through the mass of parts by rheostat controls and ammeters in unit at the right. A separate thermocouple in the fixture acts as master control for the entire assembly once the 12 units are balanced. Curing of the adhesive takes 90 minutes after balanced temperature is brought up to a range between 330 and 360 deg. F. Pressue is not released on fixture until assembly cools to 180 deg.



HOW TO DETERMINE TORQUE - TENSION RELATIONSHIPS

A few simple tests can provide data on the consistency and magnitude of the torque required to properly tighten a fastener

by **John S. Davey**
Vice President, Research & Engineering
Russell, Burdsall & Ward Bolt and Nut Co.

Hundreds of profit dollars are lost daily throughout industry because fasteners specified for a given job are not properly tightened. There are two basic reasons for this and both create unnecessary expense.

Too often, a larger and stronger fastener than needed is specified, then not tightened properly to utilize its maximum holding power. Second, but not as common, is the over-tightened. There are two basic reasons for this sequent failure on the job.

Here is a good example of over-specification of fasteners: specifications called for alloy bolts with a strength of 145,000 psi. However, in assembly they were tightened to only 30,000 psi which gave no more strength to the joint than a less expensive bright cap screw, when tightened to the same load. A cost conscious engineer could have saved a considerable sum by making a change of fasteners.

Remember that the basic job of a fastener is to hold an assembly together. And, it is this holding power that makes up the cost.

If a product requires fasteners with a safe load capacity of 13,000 pounds, bright cap screws of ¾ inch can do the job. However, a ⅝ inch high tensile bolt could also do the job at less cost. Here a one-third saving could be made by using the smaller fastener and properly tightening it for maximum holding power.

CASE OF THE EARTHMOVER CRANE BUCKET

Here is another example of improper fastener tightening: holding power is determined by the clamping force exerted by the tension induced in a fastener when properly tightened. When improperly tightened, trouble often results.

Such was the case of an earthmover, whose crane bucket kept coming loose. Bolts were upgraded progressively, finally to alloy steel in 1¼ inch size. Yet, they still failed to hold, only because they were not being tightened to full holding strength. The problem was finally solved with ¾ inch, high-tensile bolts, properly tightened. The result was better service at lower cost.

The solution to such problems is a simple one.

There are available today inexpensive, portable calibrating instruments that serve a double function: first, to accurately determine the tensile strength of any given threaded fastener; second, to calibrate an impact wrench to induce this tension.

HOW TO USE CALIBRATING EQUIPMENT

To test nuts and bolts, the calibrating equipment is used as follows.

In testing a nut, for example, the operator inserts a hardened mandrel of the proper size in the calibrator, slips on a suitable washer, then screws the nut on the extending portion of the mandrel.

Load is applied by either a hand torque wrench or an impact wrench, and as the torque is applied, the tensile load on the nut is read directly on the hydraulic gage of the calibrator.

The primary advantage of this method of testing (as opposed to the conventional straight tension test), is that the load is being applied in the same manner as it will be in actual service, and therefore, will yield a more realistic value of the useful strength of the nut.

Tighten fastener with any accurate torque wrench to determine torque-tension relationships. The total tension on fastener is indicated on direct reading dial at the top.

Inserting a fastener in Skidmore-Wilhelm tester, Adapters permit testing all sizes within range of the instrument.

When nuts are torque loaded, the ultimate stripping load is somewhat lower than the straight tensile test would indicate. Also, where nuts are loaded by torque, more dialation occurs.

Bolts are tested in the calibrator in the same manner. Here, also, the ultimate strength is somewhat lower than the straight tensile test indicates, although the difference is less. In this case, the bolt is subjected to torsional as well as tensile stresses when it is loaded by torquing. This is, of course, the same condition encountered in actually using a bolt in an assembly.

STEPS IN DETERMINING CORRECT TORQUE

In actual operation, these four steps are recommended for determining the correct torque of a specific application:

1. Insert a bolt in the calibrator from the production lot to be used.
2. Slip on one of the washers from the production lot. If no washer is used in the assembly, one should be made of the same material which the nut will bear upon in the assembly. This is an important step because variation in the surface has a very marked effect on the torque requirements.
3. Screw on one of the nuts from the production lot.

continued

If your requirements call for standard or special-purpose fasteners . . . of uniform quality . . . delivered on time . . . look to the extensive engineering and production facilities of National Lock Company. Our sales engineers will work with you. Write us.

"KEPS" ®
REGISTERED
TRADEMARK
OF ILLINOIS
TOOL WORKS

NATIONAL LOCK COMPANY
FASTENER DIVISION ROCKFORD, ILLINOIS

Use postpaid card. Circle No. 215

Torque-Tension Relationships, continued

4. Tighten the bolt with a torque wrench until the required tension is reached. (Tests have proven that as a general rule, this figure will be 70-75% of the average ultimate strength of the fastener involved.) The reading on the torque wrench at this point will automatically give an accurate torque-tension relationship and a highly accurate torque specification.

Several samples should be checked as outlined, and an average value used in setting up a standard. All the variables will have been taken into account in this test, since actual production parts are used for the test.

In conclusion, since many types of lock screws, lock-washers, and lock nuts are now commercially available, it is often difficult for the engineer to evaluate and select the particular combination best suited to his specific requirements.

SIMPLE TESTS SUPPLY NEEDED DATA

However, a few simple tests in the calibrator can supply data, not only on the relative strength of the different fasteners, but also on the consistency and magnitude of the torque requirement to properly tighten the fastener.

Some so-called prevailing-torque type lock nuts have back-off torques very little greater than a standard nut, while others require such excessive torque to tighten, that they subject the bolt to excessive torsional stress in bringing the bolt up to proper tension. Only with a tension measuring instrument, as created by torque, is it possible to intelligently evaluate these factors.

CALIBRATING AIR POWER TOOLS

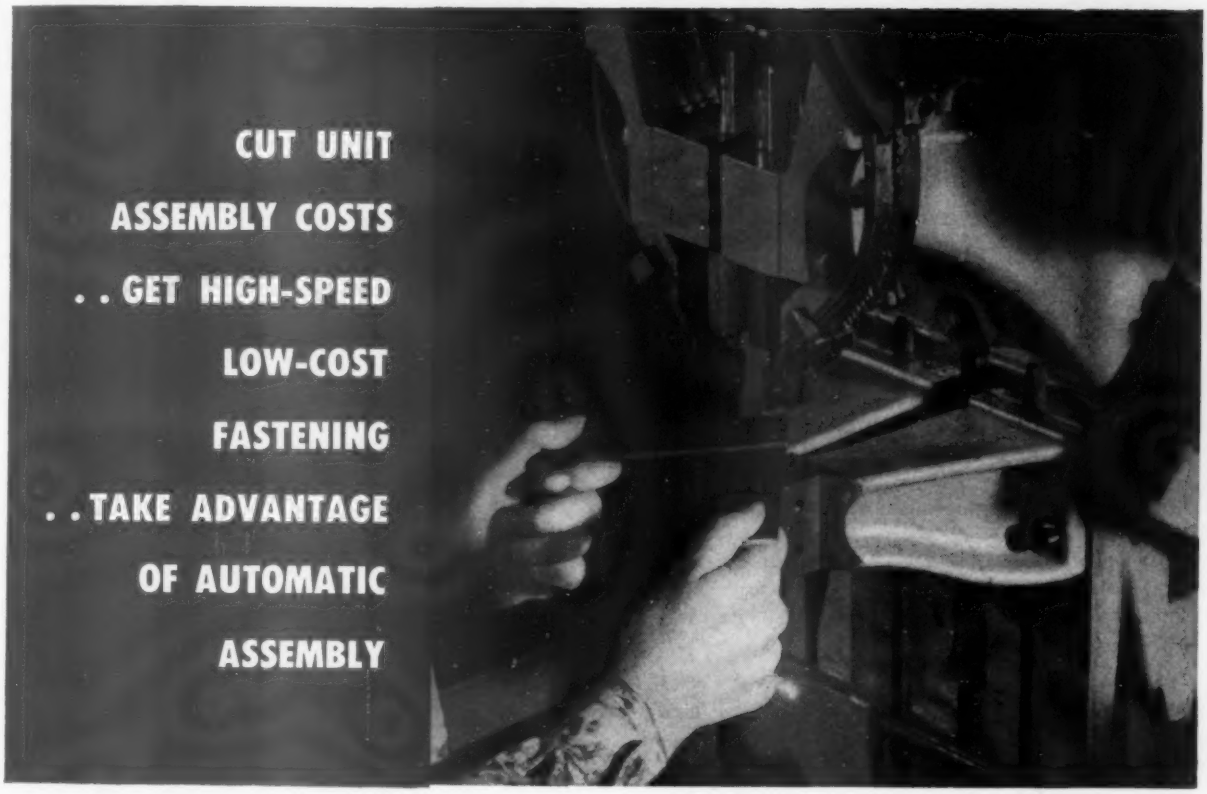
As previously mentioned, the calibrator is also a valuable piece of equipment which can be used to calibrate air power tools to stall at the desired amount of tension. For such calibration, the following procedure is recommended.

A proper sized bolt (determined by the above procedure), is inserted in the calibrator and the bolt tightened. If the resulting tension, which is read directly on the gage of the calibrator, is more or less than required, necessary adjustments are easily and quickly made on the wrench.

And since the gage of the hydraulically-operated calibrator reads direct pounds of tension being induced in the bolt, the operator can quickly determine whether his power tool is stalling out at the desired amount of tension.

Fastener manufacturers are most anxious to supply their customers with the exact type fastener for every specific application. Obviously, this is not always possible because such items are normally ordered according to strict specifications.

Therefore, every user should review his own specifications to make sure that illogical requirements or improper tightening, once on the job, are not costing him important profit dollars on his fastener purchases. •



Milford shows you how to cut assembly costs!

Tubular rivets are basically a low-cost fastener. Feed and clinch them with automatic Milford Riveters, and you *multiply* the cost savings inherent in rivets.

The Milford Riveter shown here is only one of a full line of automatic machines. Bench or floor models . . . single or multiple spindle . . . manual or automatic, the Milford Riveter line is designed to solve your toughest assembly problems.

Remember . . . these are *basic* rivet-setting machines. They can be tooled quickly and inexpensively for your particular assembly needs. And it's up to you whether you buy or lease.

For a complete line of fasteners . . . for fast, trouble-free assembly—look to Milford first!

MODEL 220-BH

RIVET CAPACITY: 3/32" dia. by 1/8" length to 9/64" dia. by 1/4" length.

THROAT DEPTH: 11"

POST HEIGHT: From 0" to 18"

HOPPER: Rotary

CLUTCH: Single trip, non-repeating Horton type

FLYWHEEL: 260 R.P.M.

DRIVE: V-belt noiseless

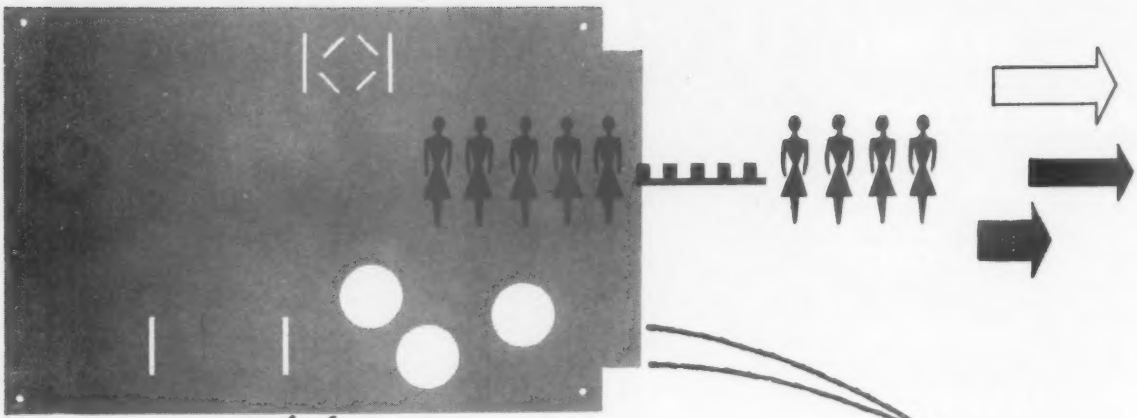
MODEL 220-BH

THE MILFORD RIVET

MILFORD RIVET & MACHINE CO.

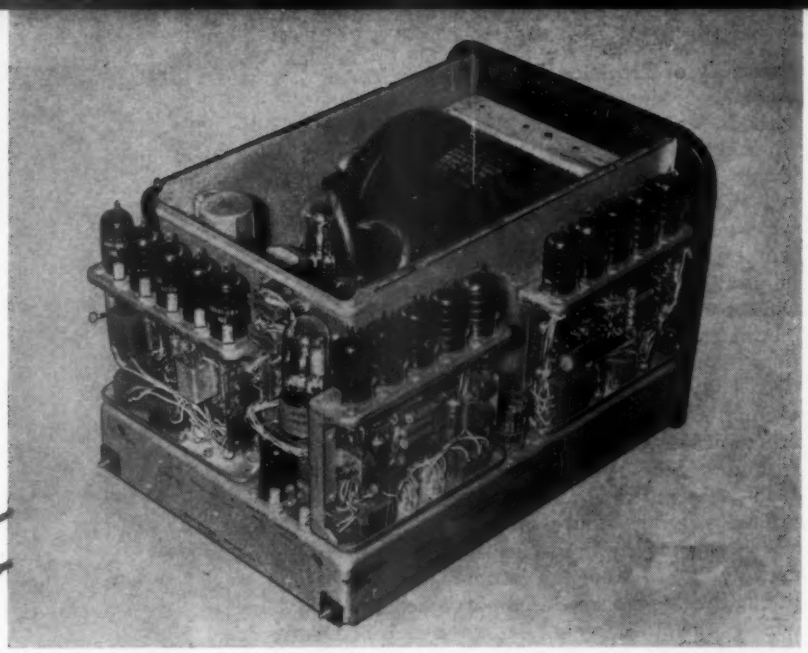
MILFORD, CONNECTICUT • HATBORO, PENNSYLVANIA • ELYRIA, OHIO • AURORA, ILLINOIS • NORWALK, CALIF.

Use postpaid card. Circle No. 216



ASSEMBLY OF PRECISION

Here is how LearCal minimizes assembly problems inherent in electronic products which use hundreds of parts that may look exactly alike



In a complex precision product like this, the similarity of many parts used, despite a difference in function, is conducive to errors. Interim inspection of subassemblies helps catch such errors, minimizing tedious circuit tracing.

ELECTRONIC PRODUCTS

by **R. E. Salrin**
Chief Production Engineer
LearCal Division
Lear, Incorporated

Electronic assembly work differs from mechanical assembly work in many ways. In conventional mechanical assembly, a number of different parts of different sizes and different shapes are put together in a manner to produce the finished product. There is little chance for error in the basic assembly work because the parts will fit together in only one way, and very seldom are two parts intended for different functions exactly alike. Any errors that do crop up in mechanical assembly are likely to be mechanical in nature also, such as a gross misfit, using the wrong torque in tightening a bolt, or omitting such incidental parts as washers, spacers, gaskets, etc. When such an error does occur, it is usually either quickly evident to an experienced inspector's eye, or determinable by a simple test.

In electronic assembly work, hundreds of parts that go into a single product may be exactly alike in size and shape. This is true of resistors, capacitors, transistors, etc. Thus a 1000 ohm ½-watt 10 per cent resistor will look exactly like a 100,000 ohm, ½-watt 10 per cent resistor. They are differentiated only by a complex system of color coding painted on the resistor body, yet accidental transition of these components during assembly may make the circuit totally inoperative. Other parts, similar in appearance but different in function, may be differentiated one from the other by a system of dots, symbols, or numerology. In any case, the chance for error in assembling such parts is much greater than the chance for error in assembling mechanical parts.

Secondly, in electronic assembly work, the various electronic components are not "fitted" together in the general sense of the word. Rather, they are united by a soldered joint. And it is just as easy to solder a terminal connection to the wrong junction as to the right junction. Furthermore, in a complex maze of soldered joints, a "wrong connection" is very difficult for the eye to detect. The circuit first must be assembled, then tested, then if anything is wrong, the circuit must be tediously traced until the wiring error is located.

These factors add up to some peculiar assembly problems which cannot be ignored along the efficient electronic assembly line. When we at the LearCal Division of Lear, Inc., Santa Monica, California, built a new factory a few years ago, we decided upon the installation of assembly lines and facilities that would minimize these peculiar assembly problems insofar as possible. As one of the nation's major producers of high precision electronic components for aircraft installation, our products must not only be rightly assembled, but must meet rigid specifications, standards and tests which broke

continued

no laxity or shoddiness in the quality of the assembly work performed.

Our first major problem, at the time of factory construction, was to decide upon the types of assembly lines to install, and methods of supplying assembly components along the line in a manner to minimize error possibilities and reduce assembly worker fatigue. We considered the latter of paramount importance because of the intense concentration required in electronic assembly work, and a tired body is a poor companion to an active mind.

Our first act was to make a comprehensive study of existing electronic assembly lines in other plants. Our only conclusion from this study was that the twin-problems of parts supply and keeping employee fatigue at a minimum were as yet largely unsolved. So we started from scratch, so to speak, designing and laying out from the bottom up, and keeping in mind the peculiar electronic assembly problems which during our years of experience in electronic assembly work had proved most bothersome.

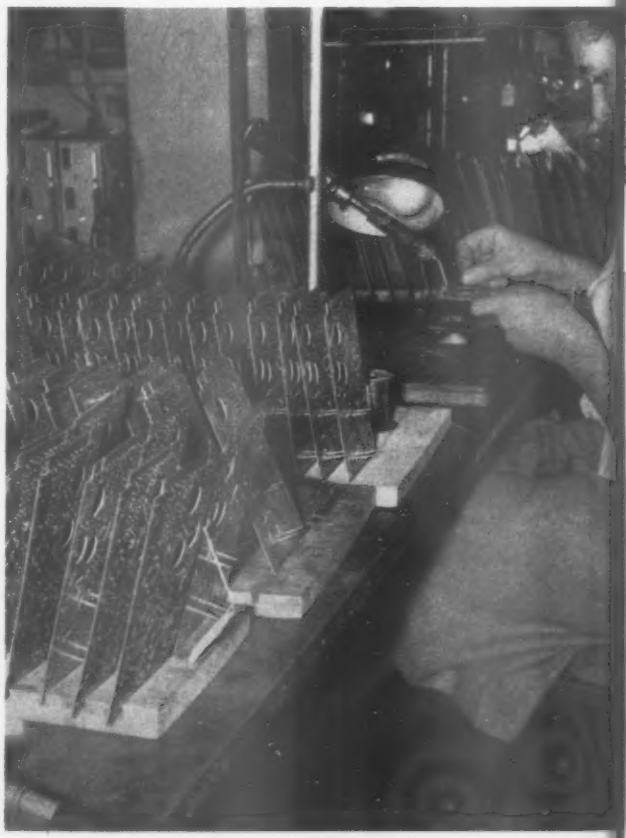
Because of the multiplicity of electronic products we produce, we decided upon 8 assembly benches each approximately 50 ft. long. These benches are divided down the middle to form 16 separate assembly lines. The workers on these lines are arranged along the bench in the order of the assembly operations, with approximately 4 ft. of bench space per worker. Interim test stations are located along each bench as required by the product being assembled. We run many interim circuit checks before the product is completely assembled. This minimizes the task of circuit tracing when the test indicates that a wiring error has been made. While each of the assembly lines can accommodate up to 12 assembly workers, smaller numbers can be used as dictated by the product being assembled. Each work station is equipped with electrical outlets for plugging in soldering irons or various test equipment. Small benches with such hand-operated tools as drill presses, grinders, etc., are located at strategic points throughout the assembly department.

With the major assembly facilities thus planned, our next big problem was to design a parts handling system to furnish assembly components as required, and with minimum employee effort to obtain them. Our current workbench supply system was designed in accordance with M.T.M. (Methods-Time-Measurement) concepts. An assembly worker can reach any part he needs with arm movement only, and with no body movement, or body assist required. We have found that this saves a great deal of both exertion and time during an eight-hour shift. .

To place this parts handling system in operation, we constructed a welded strap and angle iron superstructure running full length down the center between the two rows of assembly workers facing each other at each of the 8 assembly workbenches. Overall height of this superstructure is 30 inches. The top of this structure culminates in A-shaped brackets which are faced with strap irons and a holding bar protruding outward from each lower leg of

Close-up of compartmented work boxes resting on A-frame superstructure. A swing-out grid, containing smaller parts boxes, is visible at lower left.

Printed electronic circuits, made in LearCal's own plant, greatly simplify electronic assembly work. Here a supply of circuits await use at head of one assembly line.



For Additional Copy of this Plan Use Postpaid Card. Circle No. A4

"ROCKFORD" HOME WORKSHOP

For Additional Copy of this Plan
Use Postpaid Card. Circle No. A4

ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois

Hobby-neering with "ROCKFORD" Screw Products

"ROCKFORD"®
HOME WORKSHOP PROJECT of the MONTH

Hobby-neering with "ROCKFORD" Screw Products
ROCKFORD ILLINOIS

ORIGINAL DESIGNS

MARCH 1959

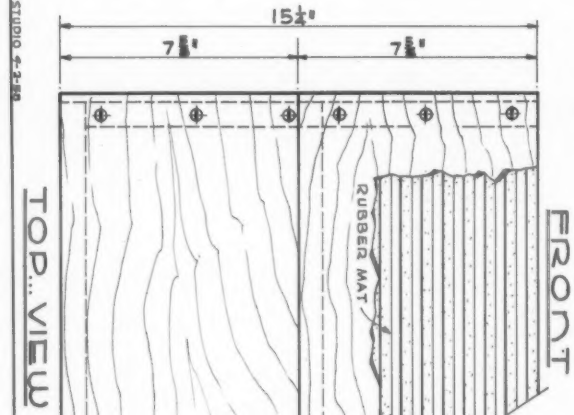
COPYRIGHT 1959 ROCKFORD SCREW PRODUCTS CO., PRINTED IN U. S. A.
ROCKFORD, ILL.

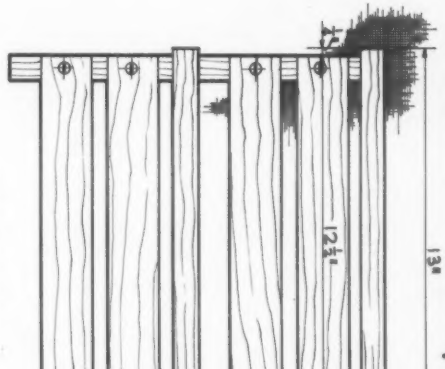
HOME WORKSHOP PROJECT of the MONTH

Hobby-nearing with "ROCKFORD" Screw Products

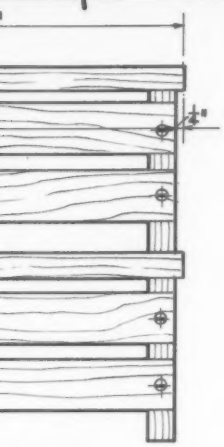
Use Postpaid Card. Circle No. A4
ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois

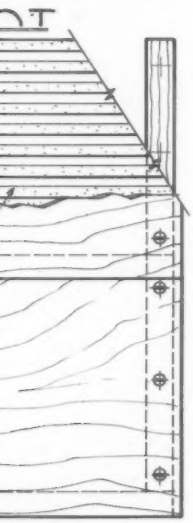
Two-step



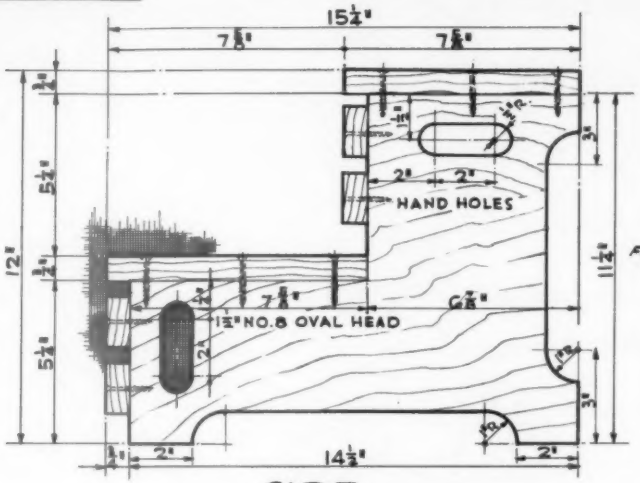


...step ...Stool





VIEW



SIDE

SCALE: INCHES 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

BILL OF MATERIALS		
2 PCS.	¾" × 11½" × 14½"	SIDES
1 PC.	¾" × 7⅝" × 13"	TREAD
1 "	¾" × 8⅝" × 13"	"
4 PCS.	¾" × 12" × 12½"	RISERS

"ROCKFORD" WOOD SCREWS
20 1¼" × 8 OVAL HEAD

FOR SOFT WOODS DRILL 5/64" PILOT HOLES
" HARD " " 3/32" " "

INSTRUCTIONS:

- THIS ONE NIGHT PROJECT IS EASY TO MAKE FOR EITHER DAD OR JUNIOR.
- A STEP STOOL IS A VERY USEFUL ITEM TO HAVE AROUND THE HOUSE TO REACH THE UPPER PARTS OF CABINETS. IT MAKES IT EASY FOR SMALL CHILDREN TO REACH THE LAVATORY TO WASH UP & SCRUB THEIR TEETH.
- USE 3/4" THICK LUMBER. ASSEMBLE WITH "ROCKFORD" QUALITY CONTROLLED WOOD SCREWS, FOR EXTRA STRENGTH, BEAUTY & DURABILITY.
- SAND ALL SURFACES & EDGES, THEN PAINT OR ENAMEL IN GAY COLORS. APPLY DECALS FOR ADDED INTEREST.
- RUBBER SAFETY MATS CAN BE GLUED TO THE TREADS. (*Make one for the Kitchen and one for the Bathroom.*)

HERM.

Hobby-neering®

SERIES... NO. 9

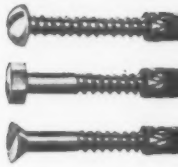
PROJECT 2

Designed by A. Lacer OF ROCKFORD

USE FOR COMMERCIAL PURPOSES IS STRICTLY FORBIDDEN

★ HERE THERE AND EVERYWHERE with "ROCKFORD"

Anchoring and Drilling Devises
for Fastening Anything to Masonry



THE RAWPLUG
NEW RO

"TOUCH OF TOMORROW GAS RANGE"

SUNRAY
REMOTE
GAS RAN

"TOUCH
Gas ra
revolut
Sma
wires
off the
as far
part of
Ante
picks u

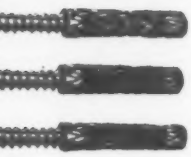
THE SU

Rockford, Illinois

ROCKFORD Screw Products

PROJECT OF THE MONTH

CKFORD" Screws and Bolts ★



Manufactured by:
AWPLUG COMPANY, INC.
NEW ROCHELLE, NEW YORK

SUNRAY PUSH BUTTON
REMOTE CONTROL
GAS RANGE

"TOUCH OF TOMORROW"

Gas range incorporates revolutionary new controls.

Small control box with no wires or cords, turn on or off the top burners from as far as 50 feet in another part of the house.

Antenna on back of range picks up the signal.

Manufactured by:
THE SUNRAY STOVE CO.
DELAWARE, OHIO

★ HERE THERE AND EVERYWHERE with "ROCKFORD" Screws and Bolts ★

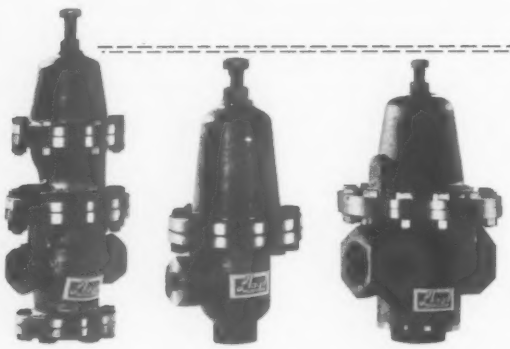
McLANE *all steel*

TRIMI'N EDGER

Exclusive Curb-Riding Feature

Manufactured by:
McLANE TOOL & DIE CO.
12819 S. Atlantic Ave.
COMPTON 2, CALIF.

MODEL NO. 100



PRESSURE REDUCING
& REGULATING VALVES

Manufactured by:
LLOYD TOOL CORP.
244 W. Colorado St.
PASADENA 1, CALIF.

For Additional Copy of this Plan Use Postpaid Card. Circle No. A4
ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois

ROCKFORD®
HOME WORKSHOP
PROJECT of the
MONTH

PROJECT of the
MONTH
"ROCKFORD"
ROCKFORD SCREW PRODUCTS CO.

"ROCKFORD" Quality - Controlled Threaded Fasteners
Within Reach of Any INDUSTRY.

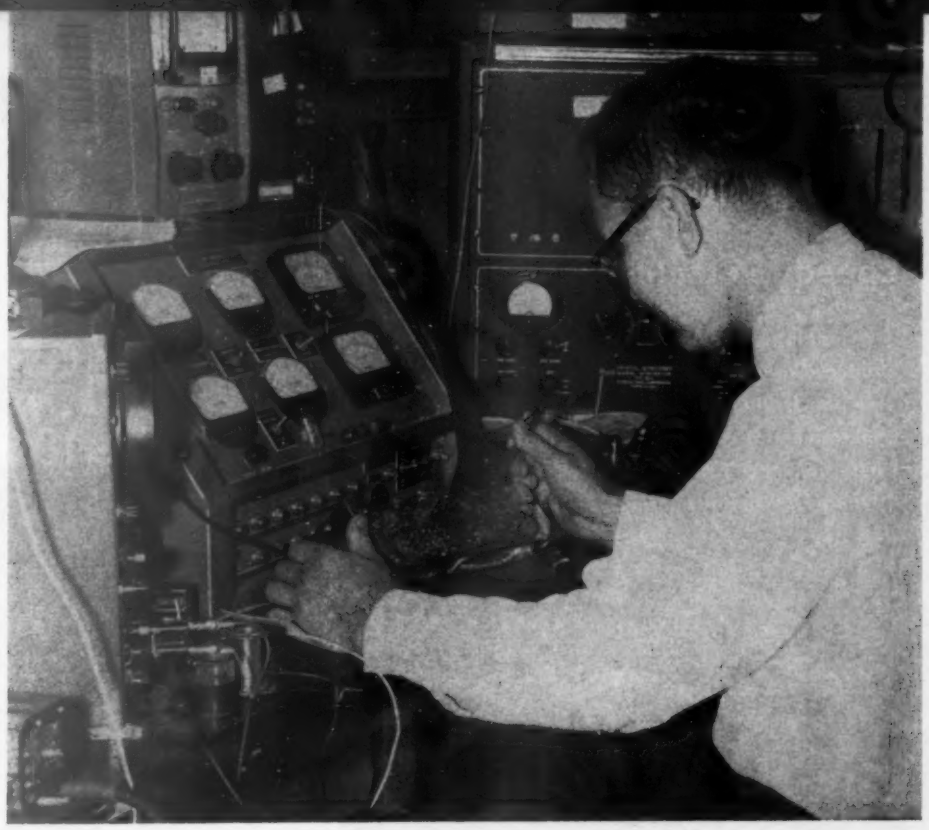
A Complete Line of Fasteners Fabricated in Our Three Modern Plants

For Additional Copy of this Plan
Use Postpaid Card. Circle No. A4
ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois

Hobby-nuring with "ROCKFORD"

"ROCKFORD"
HOME WORKSHOP
PROJECT of the
MONTH

ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois
ROCKFORD
PROJECT OF THE MONTH



Assembled electronic product (minus case) is given a final test on a master bench. Interim testing during assembly greatly simplifies this operation.

the "A". This provides a slanting holding surface, inclined toward the assembly employee, which holds the 16 by 24 inch plastic trays used to contain the larger parts. These plastic trays are in themselves provided with slide-in indentations along the interior of both sides and ends so that masonite dividers can be inserted to compartment each tray as desired.

This A-shaped superstructure is held aloft by two 20-inch long angle irons welded to the cross member of the "A". These vertical angle irons in turn provide attachment points for welded grids. The center grid at each assembly station is mounted flush and flat against the superstructure, facing the employee at the center of his work station. The two outside grids at each work station are hinged on the superstructure so that they can be swung outward to bring the parts nearer to the assembly worker. The total effect is like a three-panel screen partially closed around the person behind it.

Each of the 20-inch high grids is 12 inches wide and laced with cross-wire members from which 4 by 4 inch plastic parts boxes are hung. These small parts boxes are used for storing smaller parts such as resistors, capacitors, transistors, etc., and for miscellaneous hardware. A small clip on the front of each box holds a card denoting the part number of the component it contains.

As the grids are merely hooked to the superstructure, both they and the larger slanted parts trays can be installed or removed at will. This makes it very handy when the product on an assembly line changes, and test stations have to be installed at different points along the line.

This open tray parts supply system makes the number of parts on hand fully visible at all times. Stock dispatchers moving along the line can see at a glance where replacements are required.

This system of open and visible parts supply permits general area lighting rather than the use of individual bench lights. The superstructure itself serves a secondary but important purpose in effectively dividing the two rows of assembly workers facing each other across the bench. It cuts down distractions which might lead to serious error in precision electronic assembly work.

OPERATIONS SHEET FOR EACH WORKER

In actual assembly work, each employee is furnished with an operations sheet calling out the specific operations he must accomplish and identification of the parts he must install. He thus has only to compare the call-out identifications with the parts tray designation to ascertain the part to use.

Each of the LearCal Division's separate assembly lines produces a complete product, even down to embossing the name plates. Each product is interim tested and checked as it moves along the line. Thus when a complex aircraft radio or other electronic product leaves the line, it is ready for final checks at a master test bench, or in the screen room, to determine overall operational characteristics.

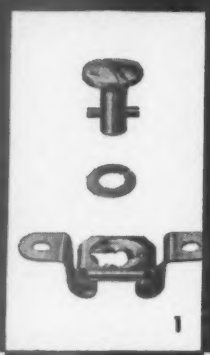
Though many innovations are involved in our electronic assembly techniques, and especially in supplying and identifying parts along the assembly line, the new system has been in operation long enough to definitely determine its value in solving, or at least minimizing, the peculiar electronics assembly problems listed earlier in this article. This article is an expression of our sincere wish that others may profit from our examples. •

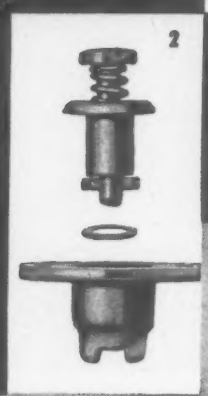
specialists in fasteners for industry

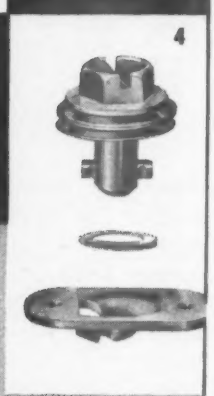
speed · versatility · positive performance

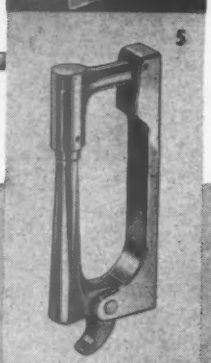
Outstanding creative engineering at Camloc has produced a variety of fastening devices. For access panels, doors, other closures, for simplified replacement of components and sub-assemblies. There are other fastening devices, designed for a variety of specialized applications, all of them retaining the three important features that characterize all Camloc products . . . speed, versatility and positive performance.

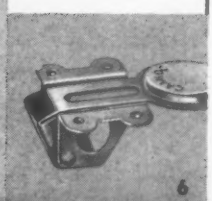
CAMLOC



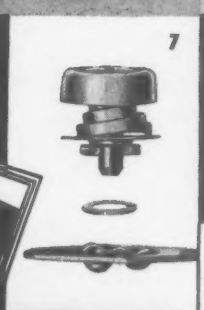


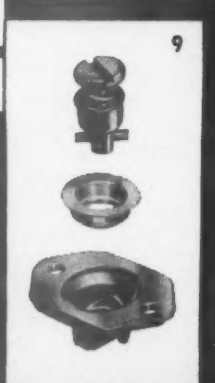






1. 5F fastener for thin materials
2. 2600 Series Quarter-Turn
3. Miniature Toggle Tension Latch
4. 91F Heavy Duty Quarter-Turn
5. Electronic Chassis Latch
6. Push Button Latch
7. 28F Series Quarter-Turn
8. 7C Harness Clamp
9. 4002 Series Quarter-Turn
10. SPF (Stressed Panel Fastener)





JUST OFF THE PRESS... The new Condensed Catalog No. 59. Write for your free copy now.

CAMLOC FASTENER CORPORATION • 14 SPRING VALLEY RD., PARAMUS, N. J. • LOS ANGELES, CALIF. • FT. WORTH, TEXAS

Use postpaid card. Circle No. 217

SLIDING FIXTURES AID CAMERA ASSEMBLY

Ansco uses sliding fixtures in machines which set rivet-nuts and rivets in their Clipper camera

Modern low-cost cameras are produced largely from stampings, partly because they can be fabricated and assembled precisely and economically at high production rates. This is particularly true of Ansco's color "Clipper", made at their plant in Binghamton, New York.

The stamped front for this camera is shown in photo at right as ready for loading in a special fixture held on the bed of a bench-type Electro-Punch unit. When the stamping is set in place, a "keeper" is flipped over to hold by gravity the work-piece that is positioned above the anvil pins where four rivet-nuts are to be applied.

Ansco camera front and four rivet-nuts are positioned in fixture having four anvils. Fixture is then advanced under solenoid-operated punch. The operator rocks the ratchet lever to index fixture. At end of each forward motion a limit switch closes, setting rivet below the punch.

SET 444 RIVET-NUTS AN HOUR

After the four nuts are set in place, the operator pushes the fixture forward against a stop. Here the first nut comes under the punch. Then the operator rocks a standard ratchet lever 90 degrees to the right four times. At the end of each right swing, a limit switch is tripped, causing the punch to make a down stroke. This rivets the nut and the punch retracts instantly.

On each reverse swing of the lever, the fixture indexes 90 degrees automatically bringing another nut under the punch, which then makes its working stroke, riveting the corresponding nut. After the fourth nut is riveted, the assembly is removed, and the fixture reloaded.

It is noteworthy that the operator's hands never get near the punch which is at the back of the bench. Also, the punch cannot be lowered until each nut, previously set at safe positions, comes into line with the punch. With this setup, four nuts can be riveted in each of 111 pieces an hour.

RIVETING PARTS TO CAMERA CARCASS

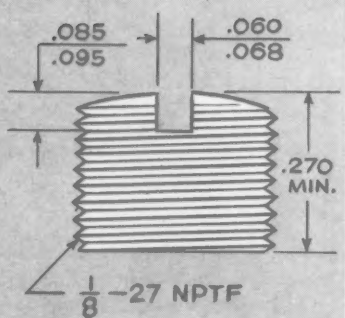
Other camera parts involving stampings are assembled on Thomas riveters, equipped with sliding fixtures. In general, location of the main stamp-

continued

SHORT PIPE PLUGS

ELCO

Dimensions shown are for standard ⅛" Short Pipe Plug widely used by makers of electric motors. Note low crown and threads carried completely to crown. ELCO also makes all sizes and types of regular Pipe Plugs in various materials.



NOW MANUFACTURED BY COLD HEADING PROCESS

The advantages of the cold heading process have now been adapted to the production of ⅛" Short Pipe Plugs, formerly made only by another method. Cold heading produces a stronger plug, of uniform strength throughout.

LOWER COSTS! COMPARE!

Cold heading also brings lower costs. Get our prices — compare with your present source! Another important feature — Elco Pipe Plugs are made with the "Dry-Seal" thread that eliminates sealing compounds and, when properly mated, will not leak at pressures up to 250 psi.

Write for full information

"ELCO SCREWS ARE GOOD SCREWS"

ELCO TOOL AND SCREW CORPORATION

1101 SAMUELSON ROAD, ROCKFORD, ILLINOIS

Use postpaid card. Circle No. 218

ing is by a pin and an edge or projection of the fixtrue, as for the main body of the camera. Other parts, such as two spool cups, two springs and a friction lever, taken from bins close at hand, are placed in position for riveting, one at a time, with the fixture in its forward position. After each part is added and correctly located by the fixture, the latter if slid forward, bringing the hole to receive a rivet below the punch that does the setting.

When this point is reached, the fixture actuates a closely set micro-switch that causes the punch to advance and set the hopper-fed rivet. In all cases, the setup is such that the operator cannot place fingers under the punch, as the clearance between the fixture and guard around the punch is too close.

After one rivet is driven, the fixture is withdrawn and a new part loaded. The fixture is advanced again, for another rivet-setting operation. This process is repeated, of course, until all rivets for a particular assembly have been driven.

Work done in this manner is safe, rapid and precise. Most rivets are driven home to produce tight assemblies, but if the part is to move around on the rivet, acting like a pivot, the fixtures are designed to provide the necessary clearance to permit the required motion of the parts. •

Parts are fastened to camera carcass in this fixture which locates the parts precisely. After parts are positioned, the fixture is pushed forward, a limit switch closes and causes the machine to trip, setting a hopper-fed rivet. Clearances are so close that operator's fingers cannot get under the punch. Sidewise location of carcass is changed before next rivet is set.

BRISTOL SOCKET CAP SCREWS MEET NEWLY ESTABLISHED INDUSTRY STANDARDS

Have higher strength, greater holding power than ever.

Bristol socket cap screws are now available to meet *all* the recommendations of the Socket Screw Manufacturers' Committee standards.

These new standards which increase the head diameter of socket head cap screws to 1½ times the body diameter—plus Bristol's advanced manufacturing techniques and stringently applied quality-control methods—are setting a new high for socket screw performance. Check these design advantages:

- Greater bearing surface under the head because of increased head diameter—for maximum holding ability.
- Less need for washers, less indenting of metal under the head.
- Greater holding power under shock and vibration.
- Larger socket—you can wrench-up screw tighter.
- Greater engagement of head with work, greater power to clamp parts, provided by torque-lock construction.

These new Bristol socket screws are just one important example of the way Bristol research and engineering develops new products to meet the needs of modern manufacturing. They're an example, too, of the reasons you'll find precision Bristol socket screws—both hex and Bristol Multiple-Spline—in such a wide variety of modern equipment today. They're used by the millions in machinery, machine tools, appliances, instruments, computers, aircraft and missiles (including count-down, tracking, and ground-support equipment), and wherever highest standards of quality and reliability are imposed. A.9.2.

ACCO

TRADE MARK BRISTOL'S REG. U.S. PAT. OFFICE

Old dimensional standards will continue to be available.

Precision socket screw manufacturers since 1913
Bristol's Hex Socket Screws
Bristol's Multiple-Spline Socket Screws
*Made in sizes as small as No. 0 in Alloy Steel and Stainless Steel. Cap screws up to 1½" diameter.

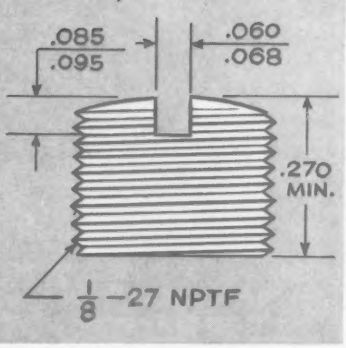
THE BRISTOL COMPANY
SOCKET SCREW DIVISION
WATERBURY 20, CONN.

Use postpaid card. Circle No. 219

SHORT PIPE PLUGS

ELCO

Dimensions shown are for standard ⅛" Short Pipe Plug widely used by makers of electric motors. Note low crown and threads carried completely to crown. ELCO also makes all sizes and types of regular Pipe Plugs in various materials.



NOW MANUFACTURED BY COLD HEADING PROCESS

The advantages of the cold heading process have now been adapted to the production of ⅛" Short Pipe Plugs, formerly made only by another method. Cold heading produces a stronger plug, of uniform strength throughout.

LOWER COSTS! COMPARE!

Cold heading also brings lower costs. Get our prices — compare with your present source! Another important feature — Elco Pipe Plugs are made with the "Dry-Seal" thread that eliminates sealing compounds and, when properly mated, will not leak at pressures up to 250 psi.

Write for full information

"ELCO SCREWS ARE GOOD SCREWS"

ELCO TOOL AND SCREW CORPORATION

1101 SAMUELSON ROAD, ROCKFORD, ILLINOIS

Use postpaid card. Circle No. 218

ing is by a pin and an edge or projection of the fixtrue, as for the main body of the camera. Other parts, such as two spool cups, two springs and a friction lever, taken from bins close at hand, are placed in position for riveting, one at a time, with the fixture in its forward position. After each part is added and correctly located by the fixture, the latter if slid forward, bringing the hole to receive a rivet below the punch that does the setting.

When this point is reached, the fixture actuates a closely set micro-switch that causes the punch to advance and set the hopper-fed rivet. In all cases, the setup is such that the operator cannot place fingers under the punch, as the clearance between the fixture and guard around the punch is too close.

After one rivet is driven, the fixture is withdrawn and a new part loaded. The fixture is advanced again, for another rivet-setting operation. This process is repeated, of course, until all rivets for a particular assembly have been driven.

Work done in this manner is safe, rapid and precise. Most rivets are driven home to produce tight assemblies, but if the part is to move around on the rivet, acting like a pivot, the fixtures are designed to provide the necessary clearance to permit the required motion of the parts. •

Parts are fastened to camera carcass in this fixture which locates the parts precisely. After parts are positioned, the fixture is pushed forward, a limit switch closes and causes the machine to trip, setting a hopper-fed rivet. Clearances are so close that operator's fingers cannot get under the punch. Sidewise location of carcass is changed before next rivet is set.

BRISTOL SOCKET CAP SCREWS MEET NEWLY ESTABLISHED INDUSTRY STANDARDS

Have higher strength, greater holding power than ever.

Bristol socket cap screws are now available to meet *all* the recommendations of the Socket Screw Manufacturers' Committee standards.

These new standards which increase the head diameter of socket head cap screws to 1½ times the body diameter—plus Bristol's advanced manufacturing techniques and stringently applied quality-control methods—are setting a new high for socket screw performance. Check these design advantages:

- Greater bearing surface under the head because of increased head diameter—for maximum holding ability.
- Less need for washers, less indenting of metal under the head.
- Greater holding power under shock and vibration.
- Larger socket—you can wrench-up screw tighter.
- Greater engagement of head with work, greater power to clamp parts, provided by torque-lock construction.

These new Bristol socket screws are just one important example of the way Bristol research and engineering develops new products to meet the needs of modern manufacturing. They're an example, too, of the reasons you'll find precision Bristol socket screws—both hex and Bristol Multiple-Spline—in such a wide variety of modern equipment today. They're used by the millions in machinery, machine tools, appliances, instruments, computers, aircraft and missiles (including count-down, tracking, and ground-support equipment), and wherever highest standards of quality and reliability are imposed. A.9.2.

ACCO

BRISTOL'S

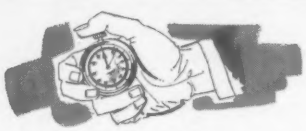
Old dimensional standards will continue to be available.

Precision socket screw manufacturers since 1913
Bristol's Hex Socket Screws
Bristol's Multiple-Spline Socket Screws
*Made in sizes as small as No. 0 in Alloy Steel and Stainless Steel. Cap screws up to 1½" diameter.

THE BRISTOL COMPANY
SOCKET SCREW DIVISION
WATERBURY 20, CONN.

Use postpaid card. Circle No. 219

Clock assembly work steps along quickly with Gardner-Denver 12E air screw driver.



TIME TO TALK TIME-SAVING

Gardner-Denver believes there's no substitute for men—it has been our philosophy of growth for 100 years. Your Gardner-Denver air tool specialist has helped many uncover ways to speed the production pace . . . lower costs. He's a good man to know.

How high-speed air tools save clock assembly time

This manufacturer uses air power to put clock assemblies together in a hurry. The main spring in this high-speed production: Gardner-Denver air screw drivers. At a touch screws spin tightly to preset torque . . . a cushion clutch eliminates runaway bits and over-torquing. In seconds the operator is ready for the next assembly.

Leading manufacturers everywhere keep production in time with air tools—Gardner-Denver drills, screw drivers, nut setters, ratchet wrenches, multiple drilling and fastening machines. They're fast, safe, easy to operate. Write today for air tool bulletins.

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER-DENVER

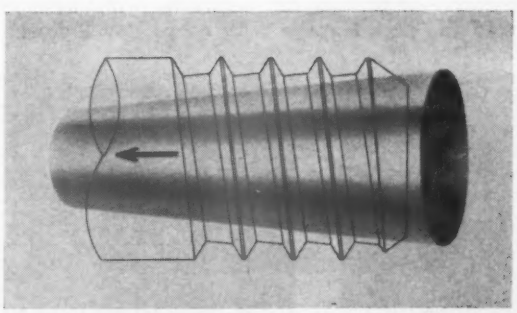
Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

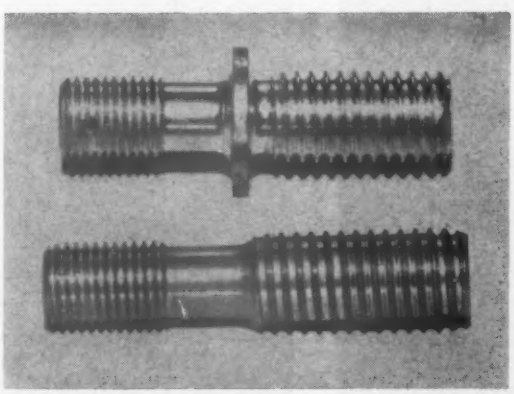
Use postpaid card. Circle No. 220

THE FASTENING OF LIGHT METALS

Self-locking fastener with wider root provides a strong fit where load is largely carried on diameter of fastener rather than on threads



Conoid superimposed over this fastener illustrates self-locking feature of 6 deg. load carrying root.



At bottom is stud with 6 deg. root diameter compared to special machined part, top, which requires a rolled spring part to lock it in position.

by **Edward B. Sturges, II**
President
Lock Thread Corporation

With the growing usage of aluminum, aluminum alloys, and other light metals has come some new assembly problems. A principal difficulty has been to find fasteners that will hold these softer "non-rigid" metals without creeping or fretting, and at the same time meet the requirements of higher temperatures and stronger forces.

Vibration and shock have also taken on vastly increased importance as higher speeds and lighter metals come into greater use. A fastener that vibrates loose in the softer metals can be a source of real annoyance in an outboard motor or in a motor propelling a lawn mower or garden tractor. It can be a serious complaint and the cause of breakdowns in motor vehicles, and it can be a source of major failures and disasters in the case of jetcraft and missiles.

Pondering this problem in the early 1940's, Mr. E. R. Evans reached the conclusion that the best self-locking fastener that would resist these forces, and also have important self-sealing qualities, would be one having a definite compression fit through more positive molding of metal-to-metal. And recognizing the importance of A.N. standards, he devised a thread form which, though slightly modified, would permit the use of standard gaging and tapping tools and still provide a greater body diameter.

By using a 6 deg. taper at the thread root, he ob-

continued

tained a modified "conical" form which, as the receiving part is reformed, gives a strong and lasting fit where the load is largely carried on the diameter of the fastener rather than on the threads themselves. This form is now called the "Lok-Thred."

The Lok-Thred form is shallower than that of the standard 60 deg. A.N. form. Its wider load-carrying root is inclined at a 6 deg. locking angle in the direction of load. The greater body cross-section adds strength to the screws. Assemblies are given added strength because of the 6 deg. root of the entering screw, which reforms the minor diameter of the receiving internal thread to its own contour with a conical fit. The screw then carries its load under compression on an inclined conical root, and subsequent loading improves the lock by a wedging action. It is this action which assures reusability of such fasteners.

Exhaustive tests of the Evans' invention has shown that his design has resulted not only in secure locking, but also great strength in torsion and tension.*

Further studies established that this concept in actual test proved to become tighter with service and shows high endurance limits—especially important factors in the assembly of light metal parts.

The ability to improve locking was obtained in a test of hold-down studs in an aluminum radial aircraft crankcase. Of the 15 studs used to hold each cylinder, an average of 383 in.-lbs. of torque was required to install the studs. After 599 hours of service, the average breakaway removal torque was 651 in.-lbs., or an increase of 70 percent. There was no loosening during the test, nor was there any indication of scoring or fretting.

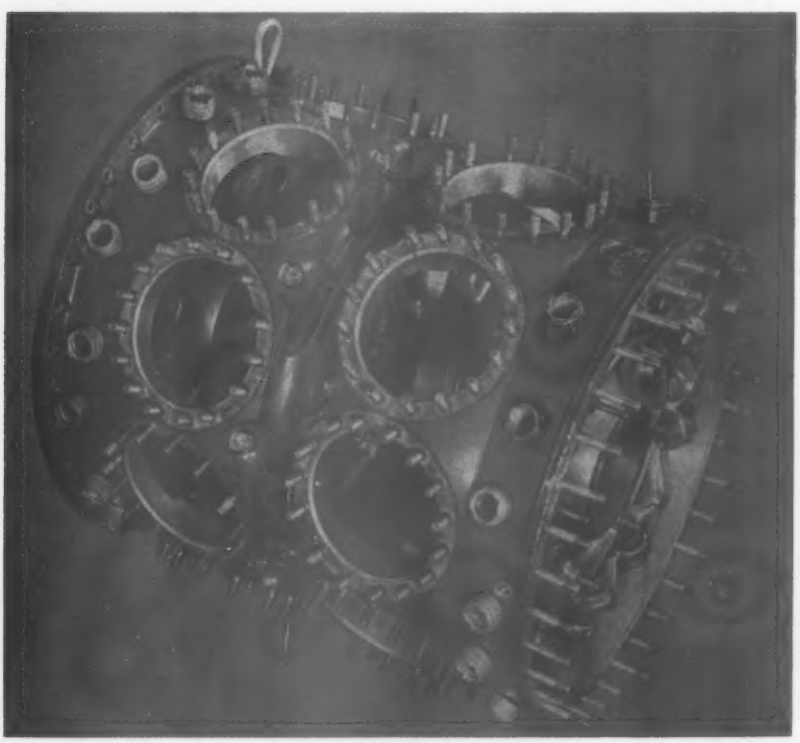
*A table showing the relative strength of 5/16-18 American National vs. different depths of Lok-Thred is available upon letter-head request to the editor.

TEST FATIGUE RESISTANCE AT ALCOA

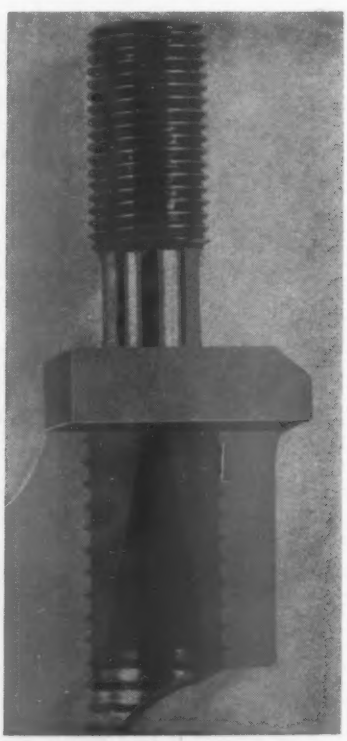
Another test conducted by the Aluminum Company of America established the resistance to fatigue of Lok-Thred assemblies. In a machine designed to simulate the connection between the cylinder and crankcase of an aviation motor, a load was applied to produce 67,240 in.-lbs. torque at the mounting face. The assembly showed no failure at 108,000,000 cycles. The normal expectancy of an assembly under this pressure is 30,000,000 cycles. Under a 20 percent increase in load, up to 80,700 in.-lbs., the same assembly showed no failure until an additional 56,-155,700 cycles had been completed. Then a failure occurred in the crankcase some distance from the studs.

There are other interesting benefits of this type of fastener, but for the purpose of this article on light metal uses, they can be summed up as follows: Locking action improves under loads imposed by vibration, tension and heat. It does not fret or loosen.

Actually, no single type of fastener can possibly solve all the answers as industry progresses with technical improvements and the use of new metals. We sincerely hope that the fastening industry will continue improving its products, and have simply cited the above apace with other developments. •



Cylinder hold-down studs in place in crankcase after a full-load service test a radial aluminum aircraft engine lasting 599 hours.



Lok-Thred stud after fatigue test of more than 160,000,000 cycles.

assembly and fastener engineering

MARCH, 1959
READER SERVICE CARD

Tear out and mail this card!

Please have information sent me on all items I have encircled.

Your Name..... Title.....

Company Address ..... Company Name.....

City ..... Zone..... State.....

Product Manufactured .....

ADVERTISEMENTS

201	202	203	204	205	206	207	208	209	210
211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230
231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290
291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310

EDITORIAL ITEMS

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

What article in this issue interested you most?_____

What subjects would you like to see published in future issues?_____

These Reader Service Cards are for your convenience. They will assist you in getting the additional information you require about any editorial item or advertisement. Because of the speed with which thousands of cards are processed each month it is essential that the blanks be filled in accurately and completely. This will save time and speed the information to you.

Please use only one Reader Service card and let one of your colleagues use the other.

assembly and fastener engineering

MARCH, 1959
READER SERVICE CARD

Tear out and mail this card!

Please have information sent me on all items I have encircled.

Your Name..... Title.....

Company Address ..... Company Name.....

City ..... Zone..... State.....

Product Manufactured .....

ADVERTISEMENTS

201	202	203	204	205	206	207	208	209	210
211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230
231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290
291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310

EDITORIAL ITEMS

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

What article in this issue interested you most?_____

What subjects would you like to see published in future issues?_____

FIRST CLASS
PERMIT NO. 272
WHEATON, ILLINOIS

BUSINESS REPLY MAIL
No Postage Stamp Necessary if Mailed in the U.S.

Postage will be paid by

ASSEMBLY & FASTENER ENGINEERING
A Hitchcock Publication
WHEATON, ILLINOIS

FIRST CLASS
PERMIT NO. 272
WHEATON, ILLINOIS

BUSINESS REPLY MAIL
No Postage Stamp Necessary if Mailed in the U.S.

Postage will be paid by

ASSEMBLY & FASTENER ENGINEERING
A Hitchcock Publication
WHEATON, ILLINOIS

FLUID POWER

"a young industry with a great future"

HOME STUDY COURSE

- **Installation**
- **Operation**
- **Maintenance**

An opportunity to learn Theory, Fundamentals of Operation, Application, Diagnosis and Repair of all types of Hydraulic and Pneumatic equipment, and controls.

Mr. Manager: Some of your good men could be "up-graded" and made even more valuable with this training. Consider company sponsored group training—it pays. Send for our literature.

Hitchcock Publishing Company

TRAINING for INDUSTRY DIVISION

WHEATON, ILLINOIS

Use postpaid card. Circle No. 221

MACLEAN-FOGG

gives you product superiority and fast, low-cost assembly with the M·F line of lock nuts and standard nuts in all sizes "off the shelf"

M·F TWO-WAY LOCK NUT

for faster application with consistent torque

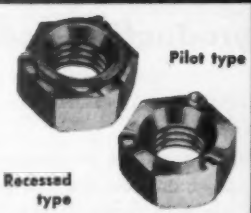
This all-metal, double chamfered, re-usable lock nut can be applied to bolt threads from either end. The center locking principle permits bolt end to be flush with top of nut.

M·F UNI-TORQUE LOCK NUT

for high torque consistency in full and jam thickness

This *consistent-torque* lock nut will withstand terrific vibration and shock loading; retains its locking ability for as many as 10 RE-applications.

M·F PROJECTION WELD NUT



for low-cost assembly

Solve production delays, cut manufacturing costs—fuse nut to the product in exact location. Engineered for assembly simplification. The welding of nuts to sub-assemblies permits the use of screws or bolts in the main assembly without the need for holding nuts from turning, cutting time and labor.

Both types available with the patented M·F Two-Way locking feature. Each type has three welding projections, eliminating rock and guaranteeing a uniform weld.

M·F SPIN LOCK NUT

the nut with the built-in lockwasher

This free-spinning one-piece lock nut eliminates the need for supplemental locking devices such as lockwashers. Cuts purchasing and inventory costs.

for you

for the asking

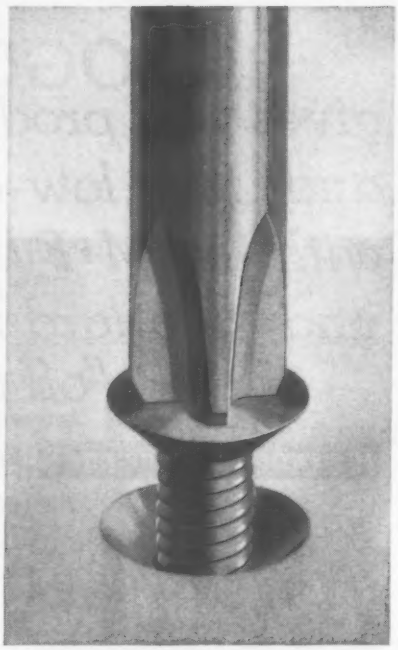
The M·F Products Catalog—valuable data on torque, bolt tension and dimensions as well as on other available products.

MAC LEAN-FOGG Lock Nut Company

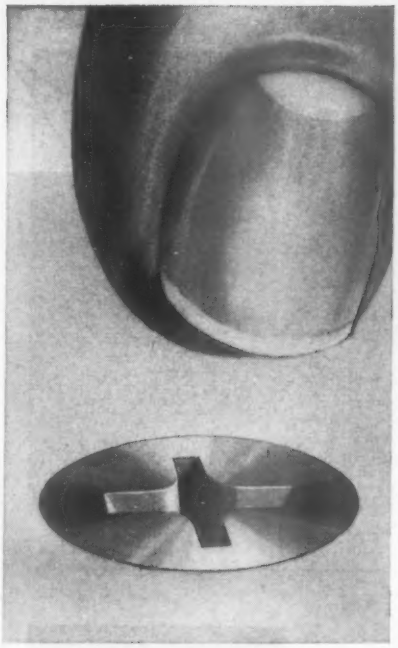
5535 N. WOLCOTT STREET • CHICAGO 40, ILLINOIS

Use postpaid card. Circle No. 222

Screw mates with driver



Goes in at top speed



Can't slip to mar surface

PHILLIPS SCREWS...the fastener with a plus!

Continuing Product Improvement (A few of many recent design changes in the Phillips screw)

- Change to 2° wing to provide more effective driving, better driving fit.
- Fillet added at upper edge of recess to permit easier driver entry and freedom from burring during driving.
- Substitution of a #2 (larger) recess for #1 on size 6 Phillips truss heads for better driveability and longer tool life.
- Slight increase in depth of Phillips recess on 100° alloy aircraft parts for better driveability without loss in head strength.

Phillips cross-recessed-head design helps you speed production, reduce costs...here's how:

Compare Phillips Cross-Recessed-Head Screws with other types of fasteners on production speed, alone!

With Phillips screws, the cross-recess mates with the driver. There's no danger of driver slippage, no slow-down in production. On the contrary, Phillips screws are ideal for use with power drivers in automatic assembly operations. Matched mating of bit and recess permits speedy assembly in awkward positions by a single operator. This perfect alignment assures straight and true driving, reduces effort required, cuts worker fatigue and increases efficiency.

But increased production speed at reduced cost is just one of the big reasons behind the continued growth and national acceptance of Phillips screws today. Greater holding power and improved appearance are other important factors that have led to this widespread adoption of the Phillips recess by so many leading users in practically every type of assembled product.

What's more, Phillips Cross-Recessed-Head Screws are constantly improved for more efficient driving and better quality in your finished product. (See box copy.) The Phillips recess is made in every type of head configuration to a universal standard by most leading fastener producers. On your fastening jobs, specify these high quality Phillips Screws. 9-1

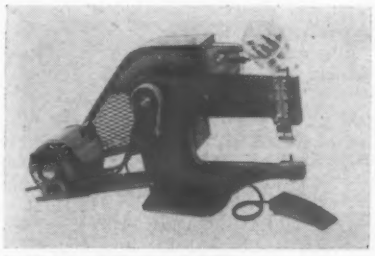
SCREW RESEARCH ASSOCIATION

PHILLIPS CROSS-RECESSED-HEAD SCREWS...THE FASTENER WITH A PLUS

Use postpaid card. Circle No. 255

WHAT'S NEW IN EQUIPMENT

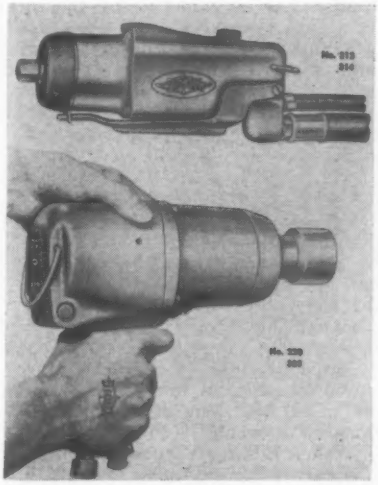
For information on any equipment listed here, use the postpaid card opposite page 40. Just circle the number on the card matching the number following the description. We'll do the rest.



(See 2)

(See 5)

(See 4)



(See 1)

PNEUMATIC, ELECTRIC WRENCHES, SCREWDRIVERS

Each of 12 models added to the Sioux line of pneumatic and electric impact wrenches and screwdrivers states its torque capacity.

Seven air-operated and five electric-powered tools are said to be highly efficient, with minimum vibration.

Smallest of the air impact wrenches, No. 313-314, weighs 2¾ lbs. and delivers 95 ft. lbs. torque. Its new exhaust system carries air and oil six feet away from the operator. The entire pneumatic line is reported to deliver 25% more torque, while consuming 30% less air.

Albertson & Co., Inc., 3100 Lowell Ave., Sioux City 2, Iowa.

Use postpaid card. Circle No. 1

ELECTRIC EYELETTER FOR ELECTRONIC ASSEMBLY

An electric eyeletting machine has been designed for the fabrication, fastening and assembly of electronic components. It will handle all makes of eyelets.

The Etco 103 will feed and set over 30 eyelets per minute. It weighs 75 lbs. and has a throat depth of 10¼". The machine features continuous automatic feeding and reportedly easily interchangeable tracks and simplified eyelet release.

Eyelet Tool Co., Inc., 236A Broadway, Cambridge, Mass.

Use postpaid card. Circle No. 2

SEALER RETAINS ADHESION WITHIN WIDE TEMP. RANGE

A sealer of caulking consistency remains permanently elastic, has excellent adhesion to most materials including metal, and retains this characteristic after extensive aging within a temperature range of 160° to —40°.

P-606 Sealer has a volume shrinkage of about two per cent. A gallon covers approximately 300 linear feet with a ¼" x ¼" bead, and it has an indefinite shelf life in a sealed container.

The new sealer can be extruded as received and should not be thinned. Viscosity becomes thinner at elevated temperature and thickens at lower temperature. It is suitable for application by hand caulking gun or pressure pump system.

Industrial Div., Armstrong Cork Co., Lancaster, Pa.

Use postpaid card. Circle No. 3

RESISTANCE WELDING DIE ADAPTORS AND ELECTRODES

Nu-Twist die adaptors and electrodes are designed to cut downtime while withstanding high welding forces without deflection or seizing.

The adaptor design is recommended especially for short run operations in electrical upsetting, projection and spot welding to be performed on one machine.

A complete unit 2⅜" high, the assembly's lack of tapers or threads allows height control, with the result that two or more units in multi-spot or projection welding are feasible.

P. R. Mallory & Co., Box 796, Indianapolis 6, Ind.

Use postpaid card. Circle No. 4

INSTALLATION TOOL FOR ALLOY BLIND FASTENERS

Model X-200 pneumatic-hydraulic double-action installation tool was developed to meet high strength needs of newer blind fasteners of stainless steel, "exotic" metal and other high alloy materials.

The tool operates on line air at 90 psi, develops pull forces up to 3000 lb. through a special mechanism which converts air pressure to hydraulic press. Tool not yet generally available.

Huck Mfg. Co., 2480 Bellevue Ave., Detroit 7, Mich.

Use postpaid card. Circle No. 5

ELECTRIC SOLDERING IRON FOR HEAVY DUTY ASSEMBLY

A heavy duty, ¼" electric soldering iron has a newly designed unit type heating element, removable and replaceable.

The element's thicker mica reduces

LOCTITE
prevents breakdowns due to nuts and bolts vibrating loose

More bowling per hour on Sherman Automatic Pin Setters assembled with Loctite Sealant

Mr. Raymond P. Nurse of Sherman Enterprises says:

"We had trouble with our machines vibrating loose. We tried several different methods of fastening, but they did not solve our problem. Then we decided to give LOCTITE Sealant a real test by using it at the National Duckpin Bowling Tournament. Twenty-four pin setters assembled with LOCTITE were used steadily for three weeks . . . 18 hours a day, seven days a week. By the end of the Tournament, LOCTITE had given an outstanding performance. We received many compliments on the operation of our machines and part of this credit goes to the American Sealants Company."

Now all critical fasteners in the Sherman Automatic Pin Setter are secured with LOCTITE against vibration. LOCTITE is a thin liquid that hardens when confined between closely-fitting metal parts. One drop replaces all sizes of lock nuts, lock washers, lock screws, staking, jam nuts, and interference threads. It forms a tough heat and oil-resistant bond that resists any amount of vibration . . . yet ordinary tools may be used to remove fasteners. LOCTITE requires no heating or mixing . . . treated parts can be stored for days . . . lock only when assembled. Write for literature and free sample.

LOCTITE® SEALANT
AMERICAN SEALANTS COMPANY
135 Woodbine St., Hartford 6, Conn.
In Canada: J. S. Parkes & Co., Ltd., Montreal

Use postpaid card. Circle No. 223

insulation failure and current-leakage. The element-lead-wire-insulator is screwed to element assembly to provide strain-relief for leads independent of element windings.

Model 3125 American Beauty has a companion angle-iron model 3125-A.

American Electrical Heater Co., 6110 Cass Ave., Detroit 2, Mich.

Use postpaid card. Circle No. 6

DRY HYDROGEN FURNACE FOR VERTICAL BRAZING

A dry hydrogen furnace that permits vertical brazing of assemblies up to 10′ long and up to 6′ in diameter is now available for controlled atmosphere brazing, heat treating and annealing. It can be used with pure dry hydrogen, argon, carbon dioxide, nitrogen or exothermic atmospheres. Usable working height is 120″ and the furnace can accept parts up to 72″ in diameter. Maximum operating temperature is 2250°F; control of temperature over the entire 10′ height is accurate within plus or minus 25°F.

The instrument-controlled unit is designed to fill a need for equipment capable of producing large brazed assemblies which meet stringent "distortion-free' specifications of atomic energy and missile programs.

Vertical brazing permits thorough circulation of the furnace atmosphere to every brazed joint. This reportedly produces dimensional accuracy of a degree impossible to achieve in long brazed assemblies with horizontal brazing techniques.

Wall Colmonoy Corp., 19345 John R St., Detroit, Mich.

Use postpaid card. Circle No. 7

PENCIL-SHAPED MAGNET FOR STARTING SCREWS

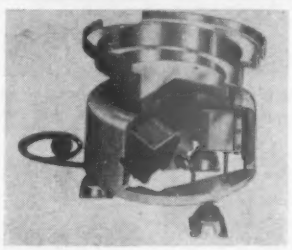
With a magnet on one end act as a holder for starting screws and small parts and a carbide insert on the other end for marking, a pocket-sized tool is made of anodized aluminum.

The magnet's small diameter also enables the tool to remove chips from holes and test material and to retrieve miniature parts. The insert will score and scribe on all ferrous and nonferrous metals, hardened steel, glass, ceramics, plastics, tile. It can be resharpened.

Maynor Tool & Cutter Co., 227 Naugatuck Ave., Milford, Conn.

Use postpaid card. Circle No. 8

ADJUSTABLE VIBRATING ASSEMBLE PARTS FEEDER



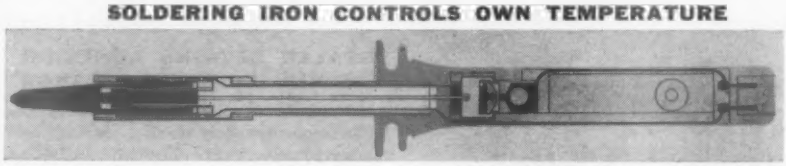
VibroBlock feeders are reported to orient and deliver standard parts at speeds up to 80 ft. per minute.

Increased output is accomplished by three (or more depending on size) special magnetic motors, whose mounting angle may be adjusted so that the horizontal and vertical components of vibration may be varied to suit the part being fed.

Arthur G. Russell Co., Inc., Forestville, Conn.

Use postpaid card. Circle No. 9

SOLDERING IRON CONTROLS OWN TEMPERATURE



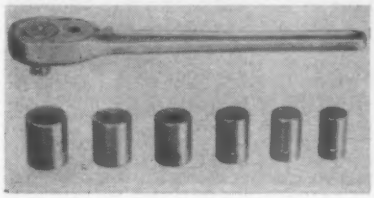
A soldering iron automatically controls its own temperature with a special magnetic alloy in the interior of the iron's tip. When the alloy is treated to a predetermined temperature it loses its magnetic qualities and a spring at the other end of the alloy pulls the alloy from the tip, thus breaking electrical contact. The iron was developed by the Weller Electric Corp. while the stainless steel tubing used is from Allegheny Ludlum Steel Corp.

Three size irons are being manufactured for assembly line use: 8″ long of 40 watts; 8½″ long of 60 watts; 9½″ long of 120 watts.

Weller Electric Corporation, Easton, Penna.

Use postpaid card. Circle No. 10

1/2" SQUARE DRIVE RATCHET HANDLE WRENCH



A ½" square drive ratchet handle wrench features 10 point socket styles. The interchangeable sockets are available in conventional 12-point sizes, as well as the combination or 10-point sizes. Socket set SV10-6 includes six ½" square drive 10-point sockets fitting 12 nut sizes together with a 10" long reversible handle.

Lowell Wrench Co., 54 Commercial St., Worcester 8, Mass.

Use postpaid card. Circle No. 11

HEX HEADED NUT DRIVERS WITH CODED HANDLES

Nut drivers with hex shaped heads are broached out of both solid and hollow stock. The new line contains color coded handles.

Available in sizes 3/16" through ½", the nut drivers' special design permit accessibility into tight spots. Handles are breakproof, shockproof.

Hunter Tool Co., Box 564, Whittier, California.

Use postpaid card. Circle No. 12

SILVER BRAZING PASTE EXPERIMENTAL KIT

A kit of silver brazing pastes allows production engineers to quickly and thoroughly evaluate this process as a production tool with minimum investment.

Consisting of standard silver braze

A NEW HIGH IN QUALITY CONTROL MEANS A NEW HIGH

in Quality Fasteners from

ALLEN

Long famous for advanced quality control techniques, Allen has expanded its Quality Control Division in its great new plant. From coil or bar stock right thru to the label on the box, each lot of Allenoy Steel is coded with its own number and checked with the finest equipment available. Furthermore, screws in process are gaged for dimensional accuracy – right at the machines.

If you want better performance made possible by the latest in manufacturing facilities, techniques and know-how, always insist on genuine *Allen* products.

LEADER POINTS — another Allen exclusive (No. 8 and up) . . . helps speed assemblies.

In Cap Screws, there's no substitute for Allen Quality: 619 *standard* items . . . pressur-formd . . . for greater strength at vital points . . . with Class 3A threads, Class 2A above 1" dia.

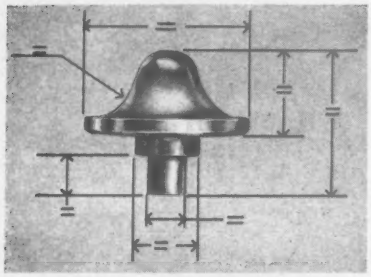
Use **FLAT HEADS** for firm fastening with flush surfaces; No. 4 thru ¾" dia., lengths ¼" thru 2" . . . **BUTTON HEADS** for that streamlined look, without countersinking; No. 4 thru ¾" dia., lengths ¼" thru 2" . . . **STAINLESS STEEL CAP SCREWS** for corrosion and heat resistance, high tensile strength; No. 0 thru ¾" dia., lengths ¼" thru 3". For complete details, see your local Distributor, or write Allen Manufacturing Company, Hartford 1, Connecticut.

ALLEN HEX-SOCKET SCREWS HEAD

IT PAYS TO HAVE HUBBELL GOOD CONNECTIONS

Manufacturers of Cold Headed Fasteners Since 1888

OVER **10** TIMES THE RATE AT **50%** SAVING IN RAW MATERIAL



Another example of how Hubbell Cold Heading produces Better Parts at Faster Speeds, at Lower Cost

THE PART:
Click Button

THE MATERIAL:
Brass

THE METHOD:
Hubbell cold heading in place of screw machining.

THE RESULT:
This brass click button was machined previously from bar stock, involving several different operations that removed nearly 50% of the total weight of the original stock . . . a wasteful, time-consuming, costly process.

Hubbell now produces essentially the same part at tremendous savings in time and material cost.

a. Production is increased from the original rate of 5.5 pcs. p.m. to cold heading rate of 60 pcs. p.m.

b. Labor, overhead and material cost has been reduced 36%.

c. The finished part is stronger, more accurate, with greater uniformity.

Hubbell Cold Heading may provide equally dramatic results for you. Whether it is presently cold headed or not, send blueprint of part or sample for analysis and estimate.

HARVEY HUBBELL, Inc. *Machine Screw Dept.*
Bridgeport 2, Connecticut

Kindly estimate on the enclosed sample (blueprint) Quantity _____

Name _____
Title _____
Company _____
Address _____

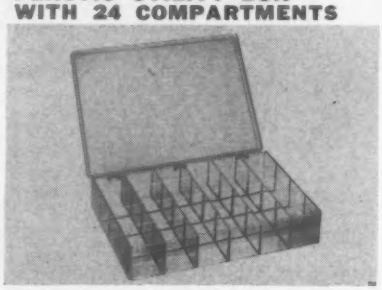
Use postpaid card. Circle No. 225

alloys and fluxes in stable combinations, the three different types of pastes have the same standard 45% alloy, although any other standard silver brazing alloy can be incorporated. The paste can be automatically applied on the production line as rapidly as three parts per second.

Fusion Engineering Co., 17921 Roseland Ave., Cleveland 12, Ohio.

Use postpaid card. Circle No. 13

PLASTIC UTILITY BOX WITH 24 COMPARTMENTS



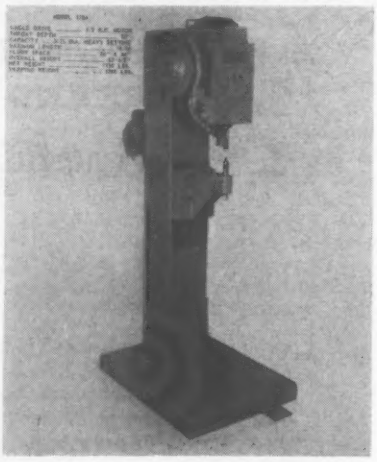
A 24-compartment, clear plastic utility box is 13⅛" long 9" wide and 2-5/16" deep.

Injection molded from crystal clear polystyrene, the P-824 has an easy-acting hinged top that operates on three heavy-duty heat-sealed hinges.

The Vlchek Tool Co., Cleveland 4, Ohio.

Use postpaid card. Circle No. 14

AUTOMATIC MACHINE SETS 5/16" SEMI-TUBULAR RIVETS



Model 110A heavy-duty riveting machine automatically feeds and sets semi-tubular rivets up to 5/16" in diameter and 18/16" in length with a heavy setting as required by the automotive industry. It has a standard throat depth of 10".

The machine has a new eccentric actuated toggle linkage attached directly to the spindle. This permits maximum force through the rivet setting range and cuts machine vibration.

Convertability to greater throat depths, fixed center, double drive, right or left hand feed-hydraulic power is possible. Tubular Rivet & Stud Co., Quincy 70, Mass.

Use postpaid card. Circle No. 15

HOPPER BIN SELF-FEEDS TO COMPARTMENTS BELOW

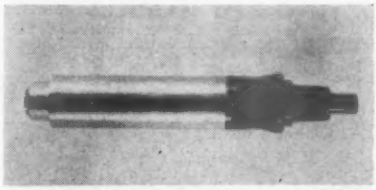
Requiring less than one sq. ft. of bench area, a hopper bin stores eight different small parts. Hoppers filled from the top are self-feeding to the compartments below. Cupped bottoms make it easy to remove contents.

The unit's size is 16¼" wide, 8" deep and 12⅝" high.

Lyon Metal Products, Inc., Aurora, Illinois.

Use postpaid card. Circle No. 16

MINIATURE PNEUMATIC IMPACT-CLUTCH DRIVER



Designed for light industrial assembly, an 8 oz. pneumatic screw driver has an impact-type, non-slipping clutch that is automatically controlled by the resistance of the fastener to further tightening.

Once the pressure reducing valve is set, all screws or nuts will be driven to same tension.

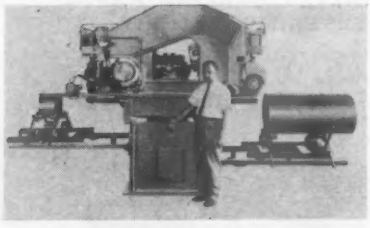
The Desoutter tool's motor runs at 14,000 rpm and is directly coupled through the clutch to the screw-driver bit. The automatic "on-off" control protects the screw head from damage.

A reversing switch is available.

Newage Industries, Inc., 222 York Rd., Jenkintown, Pa.

Use postpaid card. Circle No. 17

COMBINATION WELD-ROLLER WORKS 25 TONS AT 1000 P.S.I.



A combination dual purpose longitudinal-circumferential weld-roller developing great force at the rolls (25 tons at top pressure of 1000 psi) for the smooth and fast rolling of both butt and lap seam welds is now available

The weld roller, No. 2-LC, is hydraulically operated and has a rolling speed of 60 ft. per minute. The rolled welds are flattened to the thickness of the parent metal and the parts can be

processed without any further work on the welds.

The longitudinal end of the machine rolls welds on parts with diameters ranging from 5¼" minimum to 36" maximum, with one pass rolling on work up to 14½" long with a minimum diameter of 5¼", and up to 18½" long on pieces with diameters greater than 8" I.D.

On the circumferential roller end of the machine, parts having diameters from 5¼" to 36", with a distance of 2" to 18½" from the edge of part to the circumferential weld, can be processed.

Grotnes Machine Works, Chicago, Ill.

Use postpaid card. Circle No. 18

CARTRIDGE STUD DRIVER FOR CONCRETE, STEEL

Stud setting in steel or concrete can be done with a six cartridge load driver accommodating all styles of the ¼" and ⅜" stud sizes.

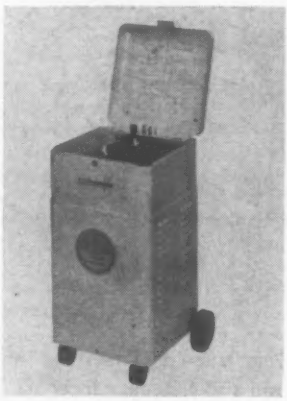
Interchangeability of each cartridge load with all stud styles in each size bracket permits the operator to make adjustments of load requirements.

The trigger-activated GH-1 driver is positioned for firing by closing breech, giving handle a half-turn and placed at fastening point at right angle to work surface.

Velocity Power Tool Co., 201 N. Braddock Ave., Pittsburgh 8, Pa.

Use postpaid card. Circle No. 19

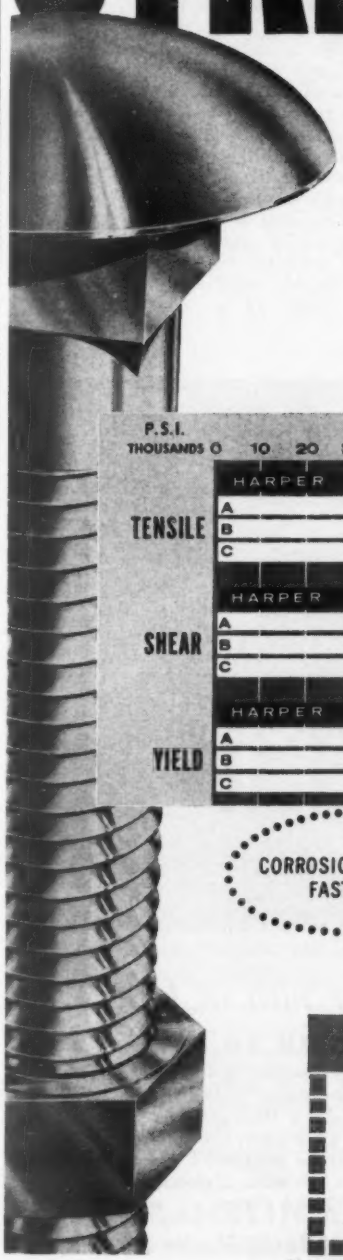
PORTABLE WELDER JOINS STUDS TO LIGHT ALUMINUM



Ability to weld insulation pins or studs up to ¼" in diameter to light gauge aluminum and other metals, without distortion or discoloration, is claimed for a portable welding machine.

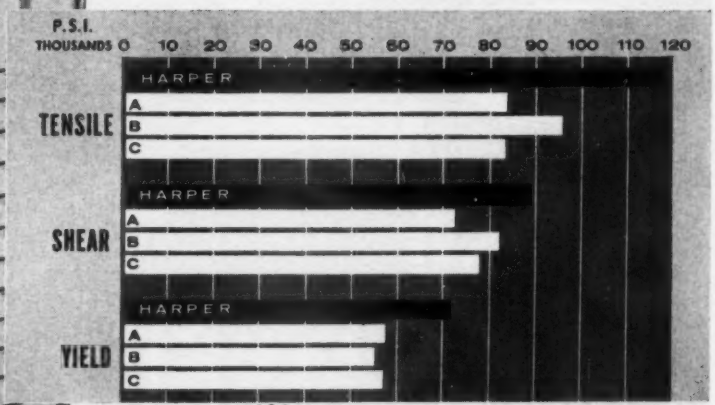
The process is accomplished by gen-

GREATER BOLT STRENGTH



Here's irrefutable *proof* of greater bolt strength! The Robert W. Hunt Company tested Harper Stainless Steel Machine Bolts in comparison with similar bolts of three other leading manufacturers. The results—Harper bolts had 35% greater tensile strength; 15% greater shear strength; 26% greater yield strength! Get the facts in a complete report prepared for you.

Harper Distributors are everywhere! . . . see your Yellow Pages!



CORROSION-RESISTANT FASTENINGS

HARPER

ATTACH TO YOUR LETTERHEAD FOR THE COMPLETE REPORT

H. M. HARPER COMPANY
8204 Lehigh Avenue • Morton Grove, Illinois

Gentlemen:

Please send me your report on "Greater Bolt Strength" at no cost or obligation.

Use postpaid card. Circle No. 226

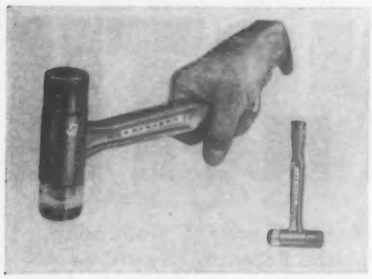
erating and localizing sufficient heat for such a short period of time that the weld is effected before the adjacent metal has time to discolor or distort.

The Super-Six operates from standard 115V, AC outlets without the use of inert gas, flux, ceramic ferrules or compressed air connections.

Graham Mfg. Corp., 152 Second Ave., Needham Heights 94, Mass.

Use postpaid card. Circle No. 20

NO-BOUNCE PLASTIC FACED THREADED TIP HAMMER



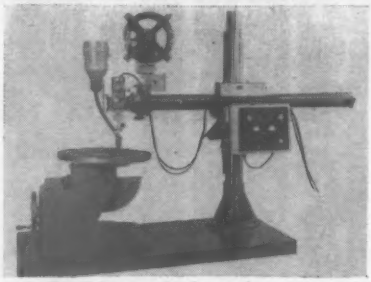
All metal body plastic hammers offer inertial impact for safety, efficiency and economy. New Taperlok threaded tips permit instant tip replacement.

Teniplex hammers are available in the 2 lb., 1½" faced tip, 2¼ lb., 1¾" face and 3 lb. 2" face.

Custanite Corp., 1228 Utica Ave., Brooklyn 3, N.Y.

Use postpaid card. Circle No. 21

FLEXIBLE MANIPULATOR FOR AUTOMATIC WELDING



A flexible manipulator for automatic welding consists of a vertical mast and horizontal boom mounted on a base, either pedestal or cylindrical type.

The tubular steel boom has infinite travel speeds from 10 to 150 in. per min. and is powered by a ¼ hp, 110 volt DC motor. Maximum clearance of the boom is 42", effective weld length, 42". Limit switches protect against overtravel.

The mast has a gear rack attached to provide for vertical movement of the boom on the mast. The vertical lift speed is 12 in. per min. through a double-worm gear-reduction gear box. The mast will pivot 360° and can be locked in any position.

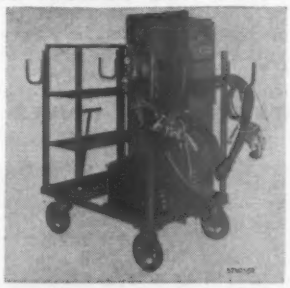
The pedestal base is heavy sheet steel, rigidly reinforced, and measures 36 in. wide, 72 in. long and 4¼ in. high.

A control panel (optional equipment) provides for speed control of the horizontal movement, forward and reverse switching, up and down switching, and a control power ON-OFF switch. It can be mounted on the manipulator or remotely mounted. All motors and cables have plug-in features. Fusetron time lag fuses protect the motors.

Miami Specialties Co., Troy, Ohio.

Use postpaid card. Circle No. 22

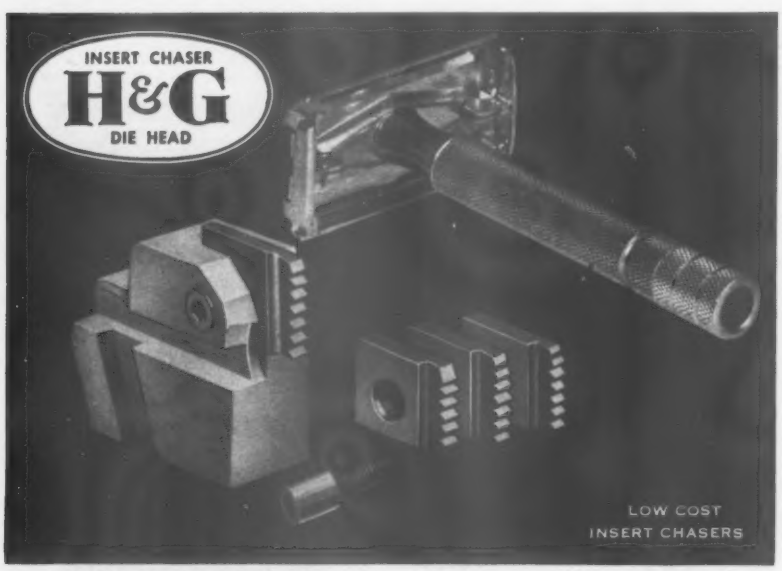
PORTABLE SPOT WELDER WITH MOBILE GUN UNIT



A mobile gun unit developed for general purpose spot welding of parts features a light weight welded steel cart for moving the unit. The welding transformer, heat regulator, electronic controls, air controls, air valve and flexible cables with air operated gun, are all mounted on the cart.

The Federal Machine and Welder Co., Warren, Ohio.

Use postpaid card. Circle No. 23



FOR LESS THAN $50 YOU GET 12 SETS, EACH SET GROUND READY TO GO

Men would not accept either idea at first . . .

INSERT CHASERS SAVE UP TO 33%

Insert chasers are like safety razor blades: they cost so little that you can throw them away when dull. Or, for utmost economy, you can resharpen them over and over again. Only a flash grind is required. For less than $50 you get a dozen sets of ¾–16 insert chasers, each set ground ready to go. You will be amazed at the quantity of threads they will cut, even to Class 3 specifications, with a minimum of downtime. FREE: "Unified and American Screw Thread Digest"

THE EASTERN MACHINE SCREW CORPORATION 25-48 Barclay St., New Haven, Conn.

Use postpaid card. Circle No. 227

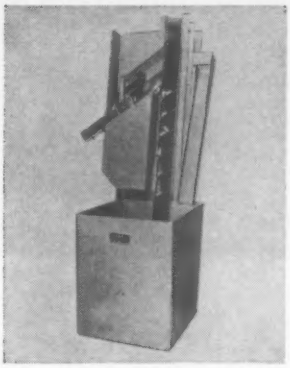
man conquers mountains

And, some day, man will also conquer cancer. With your help.

Guard your family . . . fight cancer with a checkup and a check

AMERICAN CANCER SOCIETY

SELF-DRIVEN FEEDER IS PORTABLE, AUTOMATIC



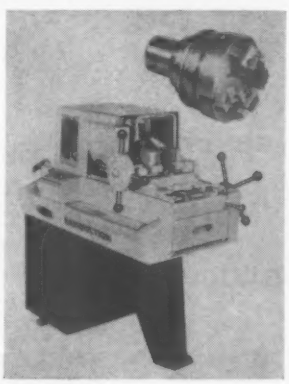
Compact size, self-contained drive and simple installation are claimed for a high-speed parts feeder. The automatic machine feeds sliding parts ⅛" to 1" in diameter from ½" to 3" long, rolling parts ⅜" to 3" in diameter, and ⅛" to 1" in thickness.

Model 2200-C features a 6 cu. ft. hopper and 6" belt width, overall size of 94" high by 30" x 56". Loading height is 38" above the floor, with take-off available on left or right hand or both.

Feedall, Inc., 38399 Pelton Road, Willoughby, Ohio.

Use postpaid card. Circle No. 24

THREADERS WITH ROTARY TANGENTIAL DIE-HEADS



Two new bolt threading machines are equipped with rotary, tangential die-heads with high speed steel, tangential threading chasers.

Machine 791-AT has a capacity covering all sizes from ¼" to 1½" and 792-AT handles ¼" to 2".

The semi-automatic die-head has a tripping and re-setting device for duplicate threading, operated with the movement of the vise carriage.

Floor space required by these machines is 48" x 27¼" and the height to the center line of the spindle is 40". Standard equipment includes an internal gear type, coolant pump driven by the motor, removable chip basket and thread length gage. Net weight is approximately 1000 lbs.

The Oster Mfg. Co., E. 289th and Nickel Plate R.R., Wickliffe, Ohio.

Use postpaid card. Circle No. 25

NOWHERE IN THE WORLD WILL YOU FIND SUCH A VARIETY OF FASTENERS UNDER ONE ROOF

EYELETS, RIVETS, GROMMETS, WASHERS, HOLE PLUGS
SNAP FASTENERS, FERRULES, TERMINALS, STAMPINGS

and many similar fasteners are made in enormous variety and quantity. Made from most any metal and in all finishes. We also make a complete line of machines for attaching eyelets, rivets, etc.

Send for our general catalog which illustrates over 1000 metal articles.

84 FRANKLIN AVENUE EDWIN B. 84 FRANKLIN AVENUE
STIMPSON
BROOKLYN 5, N.Y., U.S.A. COMPANY BROOKLYN 5, N.Y., U.S.A.

84 FRANKLIN AVENUE, BROOKLYN, N. Y.

Use postpaid card. Circle No. 228

Our Nation's business is definitely on the upswing.

Now is the time for you to increase your profits by the use of Scovill Cold Headed Fasteners.

Our Field Sales Engineers will assist you in the design of Cold Headed items that will afford savings to your concern.

Call on us at any time.

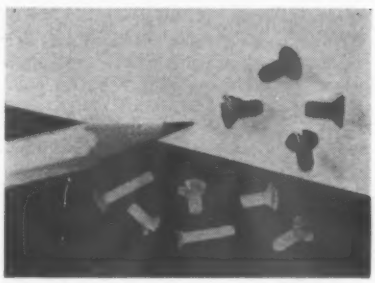
SCOVILL
Industrial Fasteners Sales
WATERVILLE DIVISION
Waterville 14, Connecticut

Special Cold Headed Parts • Phillips Recessed Head Screws • Clutch Recessed Head Screws • Washer Screw Assemblies (Sems) Tapping Screws • Standard Machine Screws

Use postpaid card. Circle No. 229

WHAT'S NEW IN FASTENERS

For further information on any of the fasteners listed here, use the handy postpaid card opposite page 40.



(See 26)

LINE OF NYLON SCREWS NOW INCLUDES MINIATURES

Precision molded nylon screws are available in two sizes, both smaller than any screws previously stocked.

The two screws are flatheads in No. 2—56 and No. 3—48, available in natural off-white nylon or colored to order. While not as strong as steel, it is said that nylon has a higher tensile strength-to-weight ratio. An excellent electrical insulator, nylon is also resistant to abrasion, and attack by fungus. Furthermore, it has high resiliency and elasticity so that nylon screws are inherently self-locking.

Gries Reproducer Corp., New Rochelle, N.Y.

Use postpaid card. Circle No. 26

(See 27)

(See 28)

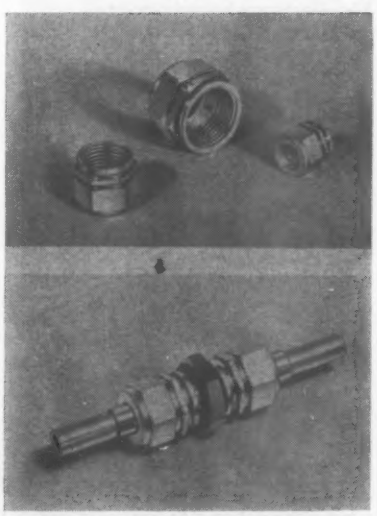
MINIATURE FLOATING SPACER NUT

A new miniature floating spacer nut, which eliminates use of shims, is made in counter bore depths from ⅛" through 3/8" in 1/16" increments. Since no shims are used, it is claimed that these two lug nuts can be installed faster and weight reduced as much as 50 per cent.

Series number M13601 conforms to NAS 1068, except for height. This same type with regular envelope, 13601, is similar to NAS686. Both miniature and standard floating spacer nuts conform to MIL-N-25027.

Nutt-Shel Co., 2701 S. Harbor Blvd., Santa Ana, Calif.

Use postpaid card. Circle No. 27



(See 29)

LIGHT, LOW-HEIGHT 160,000 PSI LOCK-NUT

A low-height, self-locking nut, especially designed for 160,000 psi short-thread screws and bolts offers a 20 to 42% weight reduction over the original Kaylock H10 hex nut series.

Wrenches for the H14 are two sizes smaller than for standard AN and NAS nuts, permitting the use of narrower flanges and allowing the bolt to be placed closer to load centerline.

The lock-nut is also being made available in A286 corrosion-resistant steel for 900°F.

Kaynar Mfg. Co., Box 2001, Terminal Annex, Los Angeles 54, Calif.

Use postpaid card. Circle No. 28

SELF-LOCKING COUPLING NUT FOR FLUID SYSTEMS

A self-locking coupling nut for hydraulic lines insures vibration-proof tightness in critical fuel, oil and refrigerant lines. The one-piece nut eliminates the drilling of coupling nuts, then tying them down with safety wire to prevent vibratory loosening.

Adaptable to either flared or flareless methods of tube sealing, and unaffected by oils, the new stainless steel nuts are usable to 800° F. working temperatures and the steel nuts to 550° F. They are interchangeable with AN 818 and MS 21914 series coupling nuts.

The fasteners are offered in cadmium-plated steel for applications to 550°F and in silver-plated stainless steel for temperatures to 800°F. Each series contains nine sizes, ranging from ¼-inch (tubing size) to 1½-inch diameters.

Standard Pressed Steel Co., Jenkintown, Pa.

Use postpaid card. Circle No. 29

MEASURE ACTUAL PRE-LOAD LOAD ACTIVITY ON BOLT

Knowledge of the actual pre-load and load activity, during pre-load or anytime thereafter, is claimed for a bolt. The Tru-Load method determines the actual tensile load on the fastener by gaging the axial unit strain in the part and translating it into stress.

This axial strain is determined by measuring the contrasting lengths of stressed and unstressed parts of the fastener. This measurement is taken at an easily accessible reference surface of the part.

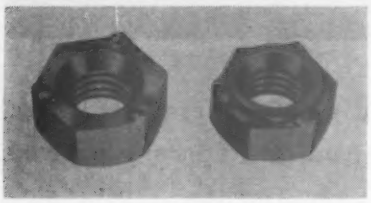
The unstressed portion is a pin inserted along the axis of the part and secured at the inner end at a predetermined distance from the reference point. This pin, since it is fixed at only one end "remembers" the original

unstressed length of the part and thereby shows the elongation or strain when the part is loaded. By means of gages this elongation is read.

Precision Threaded Products Div., The Bland Burner Co., 83 Woodbine St., Hartford 6, Conn.

Use postpaid card. Circle No. 30

PROJECTION WELD NUTS WITH AUTOMATIC PILOTING



Projection weld nuts are available in either a pilot type or recessed type for assembly simplification.

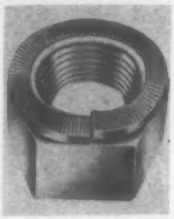
The recessed type weld nut (on left in photograph) eliminates clogging the nut threads by weld flow or spatter with a recess around the hole. No retapping is necessary.

The pilot type automatically locates in holes punched in the sub-assembly. The pilot also serves as a barrier between weld and threads. Both types are available with two-way locking feature.

MacLean-Fogg Lock Nut Co., 5535 N. Wolcott Ave., Chicago, Ill.

Use postpaid card. Circle No. 31

SEMI-FINISHED COMBINATION NUT AND LOCK WASHER

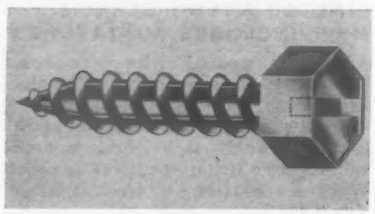


Semi-finished pre-assembled nuts and helical spring lock washers are now being produced by highly automated equipment, resulting in a low-cost, quality product. Spring-Nuts are available in steel, brass, aluminum and stainless steel in all commercial sizes. Samples available.

Jacobson Nut Mfg. Corp., Box 177, Kenilworth, N.J.

Use postpaid card. Circle No. 32

SLOTTED HEX-HEAD SCREW FOR APPLIANCE INDUSTRY



Uni-Slot screw design is claimed to eliminate burrs in the assembly of home appliances.

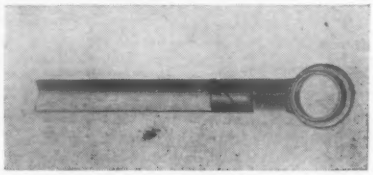
A slotted screw with an indented hex head, the slot is confined within the recess of the head. Since no separate slotting operation is required, there are no burrs.

Longer driver life, positive seating, less scrap and more safety are reported to be its advantages. Samples available.

Universal Screw Co., 2401 Brummel Pl., Evanston, Ill.

Use postpaid card. Circle No. 33

EXTRUDED RING TERMINALS ALSO ACT AS SPACERS



Extruded ring terminals, supplied in disposable reels provide the added functions of acting as spacers or lock washers.

The Etco ER-70 and 80 terminals are stamped from .020 high brass and high brass tinned. Made with .179 stud hole, they are supplied with one ear (wire) or two ears (wire and insulation). The wide insulation ears accommodate thick wall insulation and are offset to provide strong, in-line attachments.

The terminals are attachable on automatic machines in which interchangeable die dishes and rolling tools can be

Be sure to see GRC at the IRE Show

Booth 4108

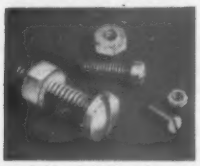
☐ REDUCE COSTS
☐ SIMPLIFY ASSEMBLY
☐ IMPROVE APPEARANCE with

DIE CAST ZINC ALLOY & MOLDED NYLON

GRC FASTENERS

DIE CAST ZINC ALLOY
Wing Nuts
Cap Nuts
Thumb Nuts

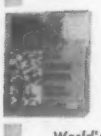
now . . .
NYLON NUTS
added to GRC's extensive line of
NYLON SCREWS



Brand New! Nylon hex nuts in ten sizes: #2 thru 5/16" . . . complementing GRC's Nylon Screw line. Nuts are single chamfered, washer-faced, double counter-sunk. All available from stock. . . Samples sent imediately.

• Uniformly accurate • Wide range of stock styles, types, sizes and threads
• High in quality Low in cost

Produced in one high speed automatic operation, GRC's exclusive methods assure uniformity, smooth, rustproof & corrosion resistant surfaces and the lowest possible cost. New kinds of fasteners never before available . . . modifications in stock fasteners for specialized use . . . infinite variety in styles, types and sizes, have been made possible by GRC's special automatic die casting and molding machines.



Write, wire, phone RIGHT NOW for prices, your copy of GRC's NEW FASTENER BULLETIN

Thumb & Wing Screws
MOLDED NYLON
Screws
Hex Nuts
Washers
Screw Insulators

World's Foremost Producer of Small Die Castings

GRIES

GRIES REPRODUCER CORP.
15 Second St., New Rochelle 3-8600, New Rochelle, N.Y.

Use postpaid card. Circle No. 230

Over 85% of the torque wrenches used in industry are

STURTEVANT
TORQUE WRENCHES
Read by Sight, Sound or Feel.

• Permanently Accurate
• Practically Indestructible
• Faster—Easier to use
• Automatic Release
• All Capacities

in inch grams . . . inch ounces . . . inch pounds . . . foot pounds
(All sizes from 0-6000 ft. lbs.)

Every manufacturer, design and production man should have this valuable data. Sent upon request.

P. A. STURTEVANT CO.

Use postpaid card. Circle No. 231

used to attach a wide variety of terminals and connectors.

Electric Terminal Corp., Warwick Industrial Park, Providence 5, R.I.

Use postpaid card. Circle No. 34

STEEL LATCHES JOIN SECTIONAL COOLERS

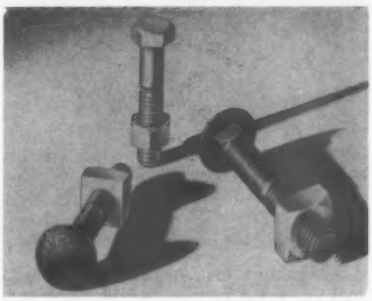
For joining of sectional coolers, two latches employ an eccentric mechanism and clutch principle which align the cooler sections. Gaskets are compressed fully.

Latch No. 1156-A for tongue and groove installations and No. 1156-B for butt type installations are both made of raw or zinc plated steel and furnished with striker pins.

Kason Hardware Corp., 71 Wallabout St., Brooklyn 11, N.Y.

Use postpaid card. Circle No. 35

CARRIAGE, MACHINE BOLTS ADDED TO FASTENER LINE



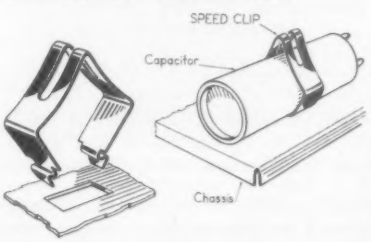
Over 500 different sized hex head machine bolts and carriage bolts have been added to a fastener line.

The full body hex head machine bolts are supplied either with or without finished hexagon nuts and have a minimum tensile strength of 55,000 psi. Carriage bolts are supplied either with or without regular square nuts.

Stanscrew Fasteners, 2701 Washington Blvd., Bellwood, Ill.

Use postpaid card. Circle No. 36

CLIP FOR ELECTRONIC CAPACITOR RETENTION



A speed clip, developed to provide fast, vibration-proof retention of capacitors on electronic equipment is assembled by first snapping over the capacitor. With the clip attached, the unit is positioned over a rectangular panel hole in the chassis and the spring legs are snapped in place over the panel edges to complete the assembly in seconds.

The spring steel clip is reported to provide retention with firm resiliency that cannot crush or damage the ca-

NEW Snap-on

MAGNETIC SOCKETS last ten times longer — give re-usable magnet bonus

Cutaway view showing socket, magnet, self-tapping screw. *Snap-on* magnetic sockets are available in the following sizes: ¼-in. drive for ¼, 5/16, 3/8-in. sockets; 3/8-in. drive for 5/16, 3/8, 7/16, ½-in. sockets; ½-in. drive for 7/16, ½-in. sockets.

On actual customer test, this newly developed socket drove 112,320 self-tapping screws. A similar competitive socket, priced only about 30 cents less, wore out after driving only 10,530 screws. Both sockets were subjected to identical conditions.

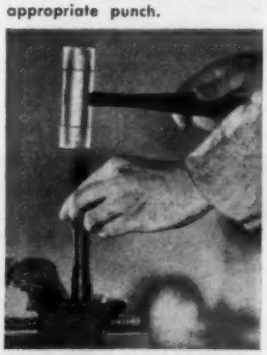
Figure what *you* can save by switching to these new *Snap-on* sockets — in replacement cost — and in assembly line downtime, too.

and here's an Extra Bonus . . . re-use your magnets — save up to 50%

In addition to far greater life, this socket is available without the magnet. You simply tap or press the magnet out of the worn-out socket — insert it in the new one. You save 50 percent on the cost of a complete magnet socket. *Snap-on* has developed an inexpensive tool that inserts the magnet to exactly the right depth.

This is an example of *Snap-on* research and development that helps industry save time and money. Your *Snap-on* industrial tool specialist can show you many more. Branch offices and warehouses are conveniently located in 58 major cities throughout the U.S. and Canada.

To remove magnet, simply tap it out of the socket with an appropriate punch.



To re-insert, just tap magnet into socket with *Snap-on* assembly punch. The entire operation takes about a minute

SNAP-ON TOOLS CORPORATION

8033-C 28th Avenue • Kenosha, Wisconsin

Use postpaid card. Circle No. 232

pacitor. Flexibility allows each of the clips to retain capacitors of varying sizes with no loss of holding power. All mounting is done from the top of the chassis without the aid of special tools, and removal of the capacitor for service is managed by simply compressing one leg of the clip to the point where it clears the panel hole and can be lifted free.

The clip is for capacitors with diameters ranging from 31/32" to 1-5/8". The clips can also be used for cable, tube or harness retention, or on any round member requiring a front-mounting fastener.

Tinnerman Products, Inc., Box 6688, Cleveland, Ohio.

Use postpaid card. Circle No. 37

NON-FATIGUING, RIBBED SPRING LOCK WASHERS

Ribbed spring lock washers are used as a hardened thrust bearing with nuts, bolts or screws. The rib or the inner periphery under compression wedges itself into the bolt thread and nut chamfer while introducing reactive pressure and tension in its assembly.

Reliance Div., Eaton Mfg. Co., Massillon, Ohio.

Use postpaid card. Circle No. 38

PRECISION BEARING LOCKWASHER ASSEMBLY

A serrated lockwasher assembly is used with a precision type bearing assembly to obtain torsional lock between the shaft and bearing locknut.

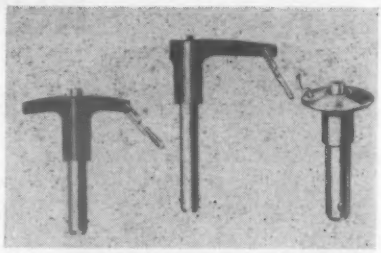
The SL 60 Sta-Lok series is designed for use in precision gear transmissions. The nut may be torqued to precise value and lockwasher installed without backing off the nut.

The SAE involute serrations broached into the washer and cut on the shaft provide the locking action and give an almost unlimited number of index positions.

Shur-Lok Corp., 879 S. East St., Anaheim, Calif.

Use postpaid card. Circle No. 39

HANDLE DESIGN IMPROVES QUICK-RELEASE PIN ACTION



A new handle design on the 5440 series single-acting Pip pins makes the self-locking, quick-release pin handle easier to grasp, insert, remove.

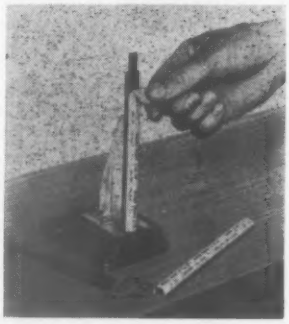
The valley around a larger release button provides additional thumb space for easier operation. Pushing the release button moves spindle to permit steel balls to recede flush with outer surface of pin body for faster insertion or removal of pin.

The T and L type handle styles and button head type are available in diameters to fit nominal holes from 3/16" through 1".

Aviation Developments Inc., 210 South Victory Blvd., Burbank, Calif.

Use postpaid card. Circle No. 40

RETAINING RING STACKING WITH COLOR-CODED TAPE



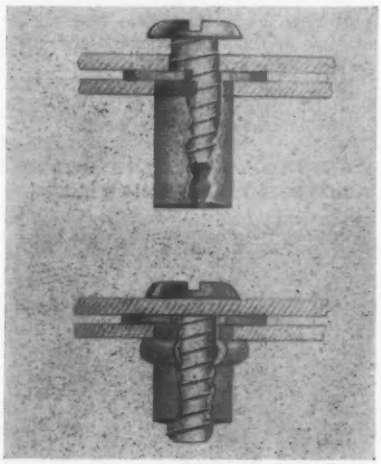
A new method of stacking Truarc retaining rings employs a wrapper of color-coded, pressure-sensitive tape to replace metal stack-rods and cotter pins.

The new packaging is reported to speed assembly, aid type and size identification and facilitate handling. Flexibility is permitted by being able to break the pack at the desired ring quantity and load into a dispenser simply by sliding the pack over the spring rail.

Waldes Kohinoor, Inc., 47-16 Austel Pl., Long Island City 1, New York.

Use postpaid card. Circle No. 41

NYLON FASTENER RESISTS VIBRATION



Assemblies are secured by a self-locking nylon fastener which joins surfaces from .010" to .100", secures fastenings in blind spots and has wide electrical and electronic application for its non-conductive properties.

The Grippit is used with screws and a hand or power driver. It is snapped into a ¼" square hole, followed with a second panel and a screw, which when turned, causes the Grippit's counterbored shank section to draw upward and outward. This forms a rigid collar behind the lower side of the inner piece of metal. Drawing the fastener up tightly secures assembly.

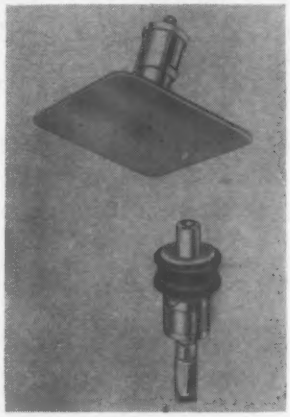
Stamford Stampings Co., Litchfield, Connecticut.

Use postpaid card. Circle No. 42

For Engineered Answers
To Your Fastener
Requirements
ANCHOR Fasteners, Inc.
Formerly CONNECTICUT SCREW & RIVET CO.
• FASTENER DESIGN & MASS PRODUCTION TO ORDER—For Automatic, Appliance, Electrical Furniture, Hardware & Other Volume Users
• COMPLETE LINE—All types of screws—special nut & washer assemblies—clips—thread cutting screws—Sems—Spinlocks—Keps®—special cold headed products
• FASTENER ENGINEERING SERVICE—Anchor's nationally recognized experts can help solve fastener problems on location in your plant
Plants & Offices: Waterbury, Conn., PLaza 6-3617
Cleveland, O., BRoadway 1-6577
Representatives in New York City • Syracuse • Baltimore
Philadelphia • Cleveland • Cincinnati • St. Louis • Chicago • Detroit

Use postpaid card. Circle No. 233

NIPPLE AND COUPLING OPERATES AT 1400 PSI



A flush-mounted nipple and coupling has an operating pressure of 4000 psi, a proof 6000 psi and burst 10,000 psi. Available in sizes from ¼" through 2", it has a temperature range of —65°F to 320°F.

The coupling is engaged by inserting the ground unit into the airborne section until it reaches a stop point. When rotated clockwise 90°, a positive, leak-proof connection is made. An audible click assures the operator that connection has been made. For added safety, a pressure lock holds the collar in locked position above 100 psi line pressure.

Airaterra Co., 1706 Standard Ave., Glendale 1, Calif.

Use postpaid card. Circle No. 43

SEE-THRU VINYL PACKAGING ON STAINLESS FASTENINGS

See-thru vinyl packaging on is a new service for more than 7,000 sizes and types of stainless steel fastenings. The new vinyl packaging will aid quick selection, keep fastenings free of dust and grime.

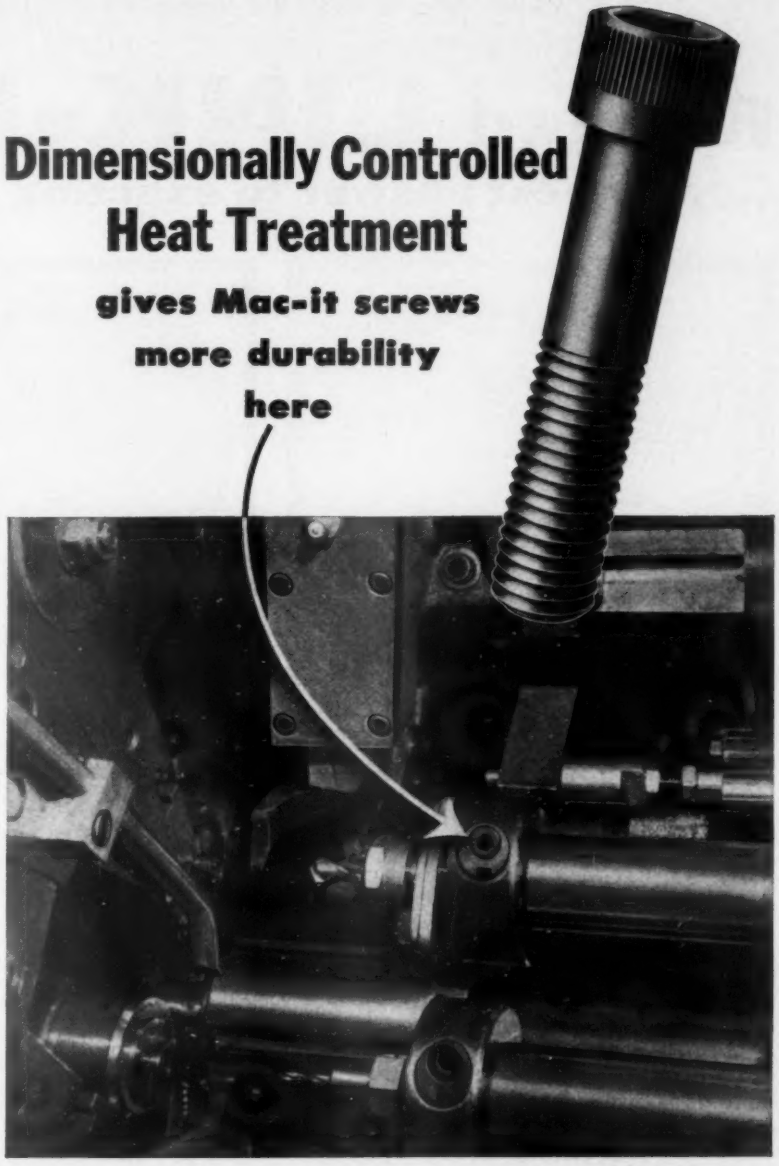
Packages are sized to standard lots, tubular in construction and permanently sealed at one end. The other end is closed in such a way that it may be opened and re-opened for convenience in use. This vinyl casing forms a pliable, tough package for use in various quarters, keeping work stations neat, and preventing small losses.

Star Stainless Screw Co., 699 Union Blvd., Paterson 2, N.J.

Use postpaid card. Circle No. 44

Dimensionally Controlled Heat Treatment

gives Mac-it screws more durability here



The heat treatment specifications for every Mac-it alloy steel screw are determined by its dimensions as well as its intended use.

At Mac-it, large and small diameters are not run through the heat treating processes indiscriminately. Instead, our metallurgists establish a heat treating cycle for each type and size. This assures that every screw has the proper combination of strength, toughness, ductility and resistance to vibration and shock.

Dimensionally controlled heat treatment is just one illustration of the care which is taken in every step in the manufacture of Mac-it screws. That's why Mac-its *hold tight in a tight place.*

Buy by name from your distributor—buy Mac-it

Mac-it®

MAC-IT PARTS COMPANY
DEPT. 20, LANCASTER, PA.

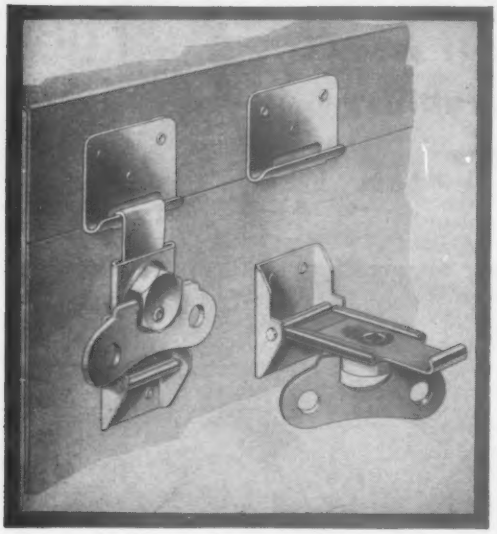
MAC-IT ALLOY STEEL SCREWS

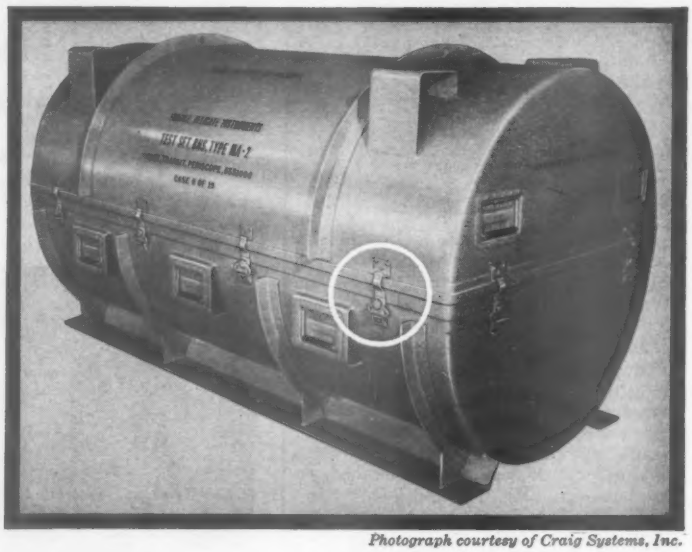
Use postpaid card. Circle No. 234

Note—Commercial and Military Packaging Engineers:

Rugged LINK-LOCK

...your best answer to exacting closure problems





Photograph courtesy of Craig Systems, Inc.

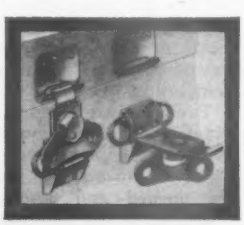
LINK-LOCK provides pressure-tight closure on this rigidly specified equipment container

Simmons LINK-LOCK provides quick opening and closing as well as impact-resistant dependability on transit cases manufactured by Craig Systems, Inc., Lawrence, Mass.

The cylindrical Craig container above is gasketed and pressure-tight, and contains delicate electronic equipment. Twelve LINK-LOCK fasteners are used on this model.

Here's why LINK-LOCK is ideal for use on military cases produced to exacting specifications as well as on inexpensive commercial containers:

- Impact and shock resistant (positive-locking).
- High closing pressure with light operating torque..... insures pressure-tight seals where required.
- Available in 3 sizes, for heavy, medium, and light duty.
- Compact design...lies flat against case even when unlocked.
- Opening and closing by wing-nut, screwhead, or hex nut.
- Flexible engagement latch design...can be varied to suit different conditions.



Also available: Spring-Loaded LINK-LOCK. Ideal for the less expensive containers where costs won't permit precision production. Spring provides take-up to compensate for set in gasketing, irregularities of sealing surfaces, and mounting inaccuracies.

Where does the versatile Simmons LINK-LOCK belong in your design? For complete information and specifications, send for the Simmons Catalog today. Samples and engineering service available upon request.

SIMMONS
FASTENER CORPORATION
1796 North Broadway, Albany 1, New York

QUICK-LOCK • SPRING-LOCK • ROTO-LOCK
LINK-LOCK • DUAL-LOCK

See our 8 page catalog in Sweet's Product Design File

Use postpaid card. Circle No. 235

USEFUL LITERATURE

To receive your copy of any literature reviewed here, use the postpaid card opposite page 40.

WIRE COMPARISON CHART

Handy loose-leaflet or wall chart lists 34 welding wires—classified by gas welding rods, bare electrodes, automatic welding wire and metal spray wire—and compares availability and ordering number between 13 suppliers, A.W.S. or A.S.T.M. spec. number given. Page Div., American Chain & Cable Co., Inc., Monessen, Pennsylvania.

Use postpaid card. Circle No. 50

HIGH SHEAR RIVETS

A revised 34-page tool catalog No. 9 announces new varieties of rivets with high shear qualities. New sets to drive stainless steel and harder material collars have been added to the line. Short rivet sets for use with stubby guns have become standard items. Illustrations, specifications. Hi-Shear Rivet Tool Co., 2600 W. 247th St., Torrance, California.

Use postpaid card. Circle No. 51

SPOT WELDING NEW ALLOY

How to spot weld Inconel X, a heat resistant alloy of high nickel content, is described in SP-20, a 12-page reprint of a technical paper. Photographs show machines which are used and resulting weldments. Diagrams illustrating welding technique and tables of welding schedules and alloy properties included. The Taylor-Winfield Corp., Warren, Ohio.

Use postpaid card. Circle No. 52

FASTENER TEST REPORT

A 13-page technical report explains a method of determining the tensile load of bolts by gauging the axial unit strain in the part and translating it into stress. This is done by measuring the contrasting lengths of stressed and unstressed (an inserted pin) parts of the fastener. Manual contains illustrations, text, five laboratory test result charts of torque-load relationships. Precision Threaded Products Div., The Bland Burner Co., 83 Woodbine St., Hartford 6, Conn.

Use postpaid card. Circle No. 53

HOSE CLAMP

Claimed for self-tightening hose clamps in six-page Bulletin HC-18 and supplementary flyers is constant concentricity and clamping pressure. Specifications, safety, inspection, finish of the clamps are discussed. Installation is done with special pliers. Corbin Hose Clamp Div., The American Hardware Corp., New Britain, Conn.

Use postpaid card. Circle No. 54

SEALING WASHERS

Washers which make any threaded fastener leakproof are described in a four-page brochure. Sealing upward, outward and downward against liquids and vapors in products or construction, the washer is illustrated and shown in application. Bartite Products Corp., Everett 49, Massachusetts.

Use postpaid card. Circle No. 55

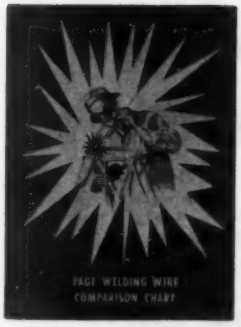
FASTENER WALL CHART

Wall chart 35" x 40" illustrates stocked corrosion-resistant fasteners (screws, nuts, bolts, washers, rivets and burs, nails, pins), their composition, specifications and ordering data. Whitehead Metal Products Co., Inc., 303 W. 10th St., New York 14, N.Y.

Use postpaid card. Circle No. 56

INDUSTRIAL ADHESIVE

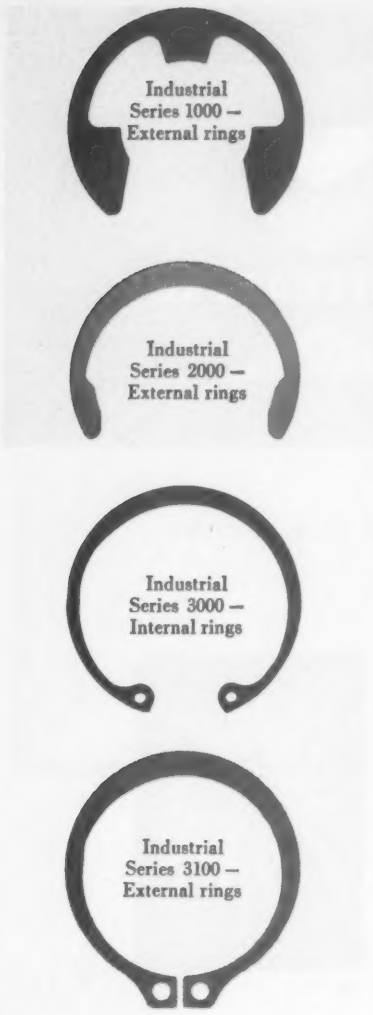
Informative Bulletin R-103 introduces the Eastman 910 adhesive in ten pages of text, tables, photographs. The liquid's uses, tensile properties, temperature and chemical resistance, handling, storing and application requirements are pointed out. Eastman Chemical



(See 50)

(See 56)

(See 55)



INDUSTRIAL
RETAINING RINGS
cut costs,
simplify assembly

Precision-engineered INDUSTRIAL Retaining Rings . . . internal, external and open types . . . are available in a wide selection of sizes and finishes. Solve your fastening problems simply and economically with the rings that cut machining and tooling expense, save material, simplify and speed assembly.

Series 1000 and 2000 are available *stacked* for quickest application.

Write for free ring samples and catalog.

IRR *Originators of modern retaining ring dispensing*

INDUSTRIAL RETAINING RING COMPANY
Dept. A-3, 57 Cordier Street
Irvington 11, New Jersey

Use postpaid card. Circle No. 236

Products Inc., 260 Madison Ave., New York 16, N.Y.

Use postpaid card. Circle No. 57

AUTOMATED SCREW DRIVER

A portable automated screw driver is reported to be four times faster than any hand feed method. A four-page brochure's photographs and text describe application features of the Jet-Setter, which handles screw diameters from No. 4 through ¼". Parker-Kalon Div., General American Transportation Corp., Clifton, N.J.

Use postpaid card. Circle No. 58

THUMBNAIL FASTENER GUIDE

An eight-page bulletin takes on added dimension as a thumbnail guide to fastener features by combining design and application information with specifications of fastener line. Socket screw products, pressure plugs, locknuts, spring pins, dowel pins and steel collars are illustrated with tables on material, thread sizes, finish. Standard Pressed Steel Co., Box 1121, Jenkintown, Pa.

Use postpaid card. Circle No. 59

NUTRUNNER-SCREWDRIVER

Adjustable to deliver proper torque for each rundown, size 5081T pneumatic Impactool is featured in a two-color, two-page flyer. The screwdriver—nutrunner is specified, shown in use and described in detail. It is said to have a torque range of 50 to 150 ft. lbs. Ingersoll-Rand Co., 11 Broadway, New York 4, N.Y.

Use postpaid card. Circle No. 60

MASS-ASSEMBLY FASTENERS

Comprehensive data on seven fastener line is featured in 12-page illustrated catalog. Specifications listed for lock washers, Sems (pre-assembled washer and screw), thread-cutting screws, Keps (pre-assembled nuts and lock washer), lock nuts, spring washers and terminals. Recommended tightening torques charted. Shakeproof, Div., of Ill. Tool Works, St. Charles Rd., Elgin, Ill.

Use postpaid card. Circle No 61

HOW TO USE ADHESIVES

Design concepts, typical applications and characteristics of adhesives are presented in easy-to-grasp text, drawings and photographs. Oil soluble and oil resistant elastomeric adhesives are covered, as well as coatings and sealers. Minnesota Mining and Mfg. Co., 900 Bush Ave., St. Paul 6, Minn.

Use postpaid card. Circle No. 62

PACKAGED ASSEMBLY LINE

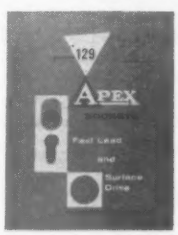
"Tips and Dies" highlights facilities available for building packaged production lines for fabricated parts. Seven sample lines are pictured in the four-page bulletin with description of operations, using presses and welding machines. The Federal Machine and Welder Co., Warren, Ohio.

Use postpaid card. Circle No. 63

POWER TOOL SOCKETS

Fast lead and surface drive sockets are treated in eight-page Catalog 129. Ranging from ¼" to ¾" drives, the power-tool-designed sockets are for hex nuts and cap screws of varying lengths. Specifications and dimensional drawings are provided. The Apex Machine & Tool Co., 1025 S. Patterson Blvd., Dayton 2, Ohio.

Use postpaid card. Circle No. 64



IMPACT WRENCH

Eleven uses of impact wrench 777 are outlined in four-page Form E-21W8. with reported constant delivered torque, the wrench delivers up to 2000 impacts per minute. Available socket sizes, accessories (bits, chucks, sleeves), nomenclature accompany photographs. Kit offered. Millers Falls Co., Greenfield, Mass.

Use postpaid card. Circle No. 65

LOCKWASHER ASSEMBLY

The function of a serrated lockwasher assembly, which provides a torsional lock between the nut and bolt, is described in a one-page data sheet SL74. Front and side views of the assembly are followed by application, installation instructions. Shur-Lok Corp., 879 S. East St., Anaheim, Calif.

Use postpaid card. Circle No. 66

BLIND APPLICATION BOLT

Hardened alloy steel bolts with either countersunk or protruding heads for blind applications are presented in four-page data sheet. Various grips, range maximums and sizes available are listed. Installation illustrated. Huck Mfg. Co., 2480 Bellevue Ave., Detroit 7, Mich.

Use postpaid card. Circle No. 67

SHEAR RESISTANT PINS

Shear, shock and fatigue are resisted by an alloy steel pin, presented in a four-page brochure. The self-locking principle is explained, specifications are listed and typical applications illustrated. Shear values of models given. Specials available. Driv-Lok Sales Corp., 777 Park Ave., Sycamore, Ill.

Use postpaid card. Circle No. 68

INDUSTRIAL BURNERS

P-R gas-air burners for high temperature alloy brazing, heating soldering pots, silver soldering and laboratory setups are presented in a four-page bulletin. A simplified chart shows the burners' capacities, supplimented by size ranges, weight and dimensions in table form and feature description. Selas Corp. of America, Dresher, Pa.

Use postpaid card. Circle No. 69

HOLLOW RIVETS

A four-page brochure answers questions about Pop rivets: the fastening concept, advantages, types, materials, sizes. Selection and useage data is in chart form. Installation tools are pictured. Pop Rivet Div., United Shoe Machinery Corp., West Medway, Mass.

Use postpaid card. Circle No. 70

STAINLESS STEEL DATA

Valuable research findings on stainless steel, as particularly related to hex-socket screws, is contained in 16-page Bulletin G-22. Both "pros" and "cons" of various types of stainless steel alloys used in fastener manufacturing cited. The booklet includes test methods, temperature characteristics, tables of chemical composition and mechanical properties and degree of corrosion resistance to hundreds of substances. Allen Mfg. Co., Bloomfield, Connecticut.

Use postpaid card. Circle No. 71

VIBRATING FEEDER

Features of the VibroBlock vibrating feed are covered in two-color, four page Bulletin 5807. Descriptions of special magnetic motor, controller, bins and transportation rail are included. Types of parts capable of orienting and feeding are shown, with model specifications. Arthur G. Russell Co., Inc., Forestville, Connecticut.

Use postpaid card. Circle No. 72

LINE CLAMP PLIERS

Pliers designed to speed line clamp installation are introduced in a two-color, two-page flyer. Step-by-step use of model 82 for use with No. 8 or 10 mounting bolts is shown with photographs and text. TA Mfg. Corp., 4607 Alger St., Los Angeles 39, California.

Use postpaid card. Circle No. 73

THREADED STAMPINGS

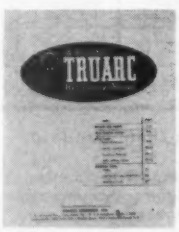
How threaded stampings, manufactured in one operation, is reported to cut costs is told in a four-page circular and four case histories. Sample parts are pictured and described. Holes in stamping are tapped squarely and threads can be held to class 1, 2 or 3 fit. The Mohawk Mfg. Co., Box 1110, Middletown, Conn.

Use postpaid card. Circle No. 74

RETAINING RINGS

More than 75 representative customer applications are illustrated in a 24-page catalog on Truarc retaining rings, pliers and accessory tools. Catalog RR 10-58 also includes selector guides to the 20 standard ring series and 30 special rings available, divided into series for axial and radial assembly, end-play take-up and self-locking types. Waldes Kohinoor, Inc., 47-16 Austel Pl., Long Island City 1, N.Y.

Use postpaid card. Circle No. 75



EYELETS AND MACHINES

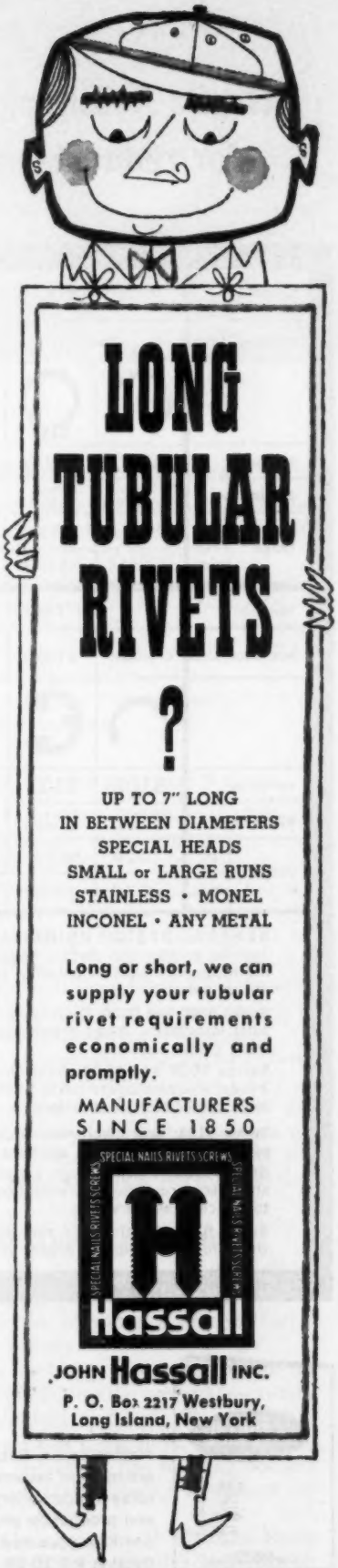
More than 60 eyelet sizes and three eyeletting machine models are described in four-page Bulletin SE15. The standardized eyelets are used as fasteners, reinforcements, pivots, bushings—especially in the electronic industry. Listed by barrel length and diameter, with complete specifications. Machine characteristics defined. United Shoe Machinery Corp., 140 Federal St., Boston, Mass.

Use postpaid card. Circle No. 76

RIVET SPINNERS

A noiseless, blowless, line of rivet spinning machines is specified in an eight-page catalog. The fastening method is explained and uses of the six photographed models outlined. Also described are the double-end automatic threading machines designed to operate on both ends of such parts as rods and spindles. Samples of work pictured. Grant Mfg. and Machine Co., Bridgeport 5, Conn.

Use postpaid card. Circle No. 77



Use postpaid card. Circle No. 237

Truarc Retaining Rings, the engineered fastening method for reducing material, machining and assembly costs

function		for axial assembly				for taking up end-play					
						axial assembly				radial assembly	
nomenclature		basic		inverted		bowed		beveled		prong-lock®	bowed e-ring
series no.		5000	5100	5008	5108	5001	5101	5002	5102	5139	5131
application		Internal for Housing Bores	External for Shafts	Internal for Housing Bores	External for Shafts	Internal for Housing Bores	External for Shafts	Internal for Housing Bores	External for Shafts	External for Shafts	External for Shafts
range	in.	.250-10.0	.125-10.0	.750-4.0	.500-4.0	.250-1.456	.188-1.438	1.0-10.0	1.0-10.0	.094-.438	.110-1.375
	mm.	6.4-253.8	3.2-253.8	19.0-101.5	12.7-101.5	6.4-37.0	4.8-36.5	25.4-253.8	25.4-253.8	2.4-11.1	2.8-35.0

function		for radial assembly				self-locking types					
nomenclature		crescent®	e-ring	reinforced e-ring	interlocking	circular self-locking			triangular self-locking	triangular nut	grip-ring
series no.		5103	5133	5144	5107	5005	5115	5105	5305	5300	5555
application		External for Shafts	External for Shafts	External for Shafts	External for Shafts	Internal for Housing Bores	External for Shafts	External for Shafts	External for Shafts	With Threaded Screw	External for Shafts
range	in.	.125-2.0	.040-1.375	.094-.438	.469-3.375	.312-2.0	.094-1.0	.094-1.0	.062-.437	•	.077-.755
	mm.	3.2-51.0	1.0-35.0	2.4-11.1	11.9-85.7	7.9-50.8	2.4-25.4	2.4-25.4	1.55-11.1	•	•

GENERAL DESIGN PRINCIPLE: Tapered construction permits rings to maintain constant circularity and groove pressure.

Series 5000 and 5100: Basic types for axial installation. Rings provide optimum groove strength.

Series 5008 and 5108: Best clearances. Accommodate parts having large corner radii or chamfers.

Series 5103: Best clearances. Secure against moderate impact, vibration.

Series 5133: Provides high coupling shoulders; accommodates wide groove tolerances. Easy servicing.

Series 5144: Reinforced E-ring. Five times more gripping strength, 50% higher RPM limits than standard E-rings.

Series 5107: High impact resistance; high coupling shoulders. Accommodates extremely high rotation and relative parts rotation.

Series 5001 and 5101: Resilient end-play take-up. Accommodate wide tolerances. Recommended for pre-loading bearings.

Series 5002 and 5102: Rigidly locked end-play take-up. Recommended for locking one race of parallel bearing assemblies.

Series 5139: Rigidly locked into position by protruding locking tabs. Provides high resilient end-play take-up with sliding tabs for uniform flexure. Cannot be forced from groove without destroying ring. Accommodates relative parts rotation. Equally effective with round, square, rectangular or hex shafts.

Series 5131: Provides high take-up. Recommended where clearances are a major problem.

Series 5005, 5115, 5105 and 5305: Prongs dig into shaft, locking rings against movement in one direction.

Series 5300: Spring tension locks parts assembled with threaded screws.

Series 5555: Self-locking against movement in either direction by spring tension. Since no groove is required, ring is adjustable to any position on shaft.

©1958 Waldes Kohinoor, Inc.

Waldes Truarc Retaining Rings are modern fasteners that solve a wide variety of design and production problems. Send for your new 24-page Catalog RR 10-58. 9.4

WALDES TRUARC® RETAINING RINGS

Waldes Kohinoor Inc., Long Island City 1, N. Y.

Use postpaid card. Circle No. 238

INDUSTRY MAKES NEWS

One drop of adhesive bonds rig suspending Garry Moore off the stage.

Temperatures up to 2150 F are provided in GE's new gas-fired brazing furnace in Lynn, Mass.

GARRY MOORE DEMONSTRATES ADHESIVE

A dramatic demonstration of Eastern 910 adhesive was performed for viewers on "I've Got A Secret" by television star Garry Moore recently.

Moore was lifted several feet off the stage and suspended from a rig made up of two steel cylinders which Eastman's Dr. Harry Coover, a contestant on the program, had bonded together with a single drop of the adhesive two minutes before.

Coover is in charge of the research project which produced the unusual product.

NEW GE FURNACE TO BRAZE JET PARTS

A new high temperature, gas-fired brazing furnace that provides temperatures up to 2150°F has been installed by General Electric's Small Aircraft Engine Dept., Lynn, Mass. for heat treating its T58 and J85 engine components.

In addition to high temperature brazing, the atmospherically-controlled furnace can be used for bright annealing. It is rated 1½ million BTU. Besides nozzle diaphragms, other engine parts treated in the furnace include ring seals fuel diaphragms.

Loaded cars are elevated into the furnace heating chamber for treatment. Work is placed inside an alloy retort and protected from oxidation with dry hydrogen. Cooling is accomplished in a separate air cooling chamber. Cars are moved in front of the furnace for loading and unloading between cycles.

WELDING TO BE FEATURED IN APRIL

Welding will be featured in programs throughout the nation during April, National Welded Products Month, to dramatize the importance of welding to the economy of the country.

"For many years welding has been taken for granted," stated Fred L. Plummer, national secretary of the American Welding Society. "There are 37 different welding processes recognized by the welding industry, and so important has welding become that the usefulness of metals today is judged by their weldability."

The 40th annual Convention and Welding Show April 6-10 will spearhead the month's activities in

Chicago. The city will be host to the world's foremost welding experts, metallurgists, manufacturers and fabricators. The latest equipment and materials will be on view at the International Amphitheatre, and the technological progress of the industry will be told at the technical sessions in the Hotel Sherman.

Eighty-one AWS sections throughout the country have been alerted and local plans include: proclamations by governors and mayors, cooperation by local industries, plant tours, department store promotions, civic functions, and similar plans which will help to reveal the part welding is playing in the national economy.

COMSTOCK SALES V-P AT GARY SCREW

A. Barr Comstock, Jr. has been named vice president in charge of sales for the Gary Screw and Bolt Div. of Pittsburgh Screw and Bolt Corp., succeeding Robert W. Dieker it was announced today by Donn D. Greenshields, president.

Comstock has been general sales manager of Pittsburgh Screw and Bolt with offices in Pittsburgh, Pa. Dierker is retiring after 49 years service with the corporation. He is a past president of the Hardware Golf Association.

ALLIED SCREW OF DIXIE HANDLES RIVETS

A complete line of rivets and both manual and powered riveting tools being manufactured by the Pop Division of United Shoe Machinery Corp. now are available in Florida from Allied Screw of Dixie, it was announced today by Mr. Albert Levine, president.

ANCHOR FASTENERS PURCHASES TRU-LOCK

Anchor Fasteners, Inc., has purchased the stock of Tru-Lock Fasteners, Inc., Woodbury, Conn., with production facilities being moved to Waterbury, Conn. announced John A. Largay, president of Anchor.

William Wedgewood (pictured), former president of Tru-Lock, has joined the staff of Anchor Fasteners as project engineer of the nut division. Wedgewood was formerly sales manager of Boots Aircraft Nut Corp. and Waterbury Pressed Metals, Inc.

HUBBELL NAMES NEW SALES OFFICES

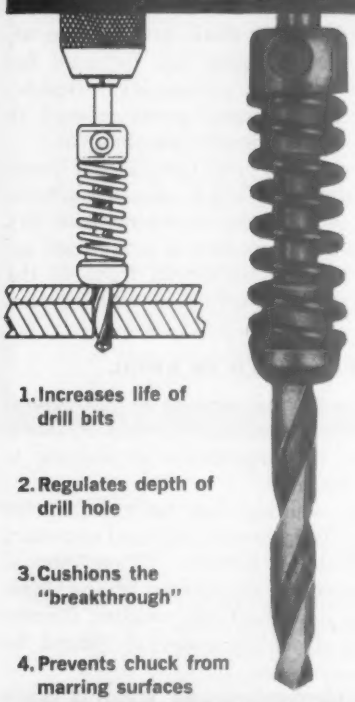
The Machine Screw Department of Harvey Hubbell, Inc., Bridgeport, Conn. has extended its sales and service coverage by adding three new sales offices: Paul J. Polke Co., 11 Park Place, New York 7, N.Y.; Barker Instrument & Machine Co., Inc., P.O. Box 335, Charlotte, N.C.; and Imperial Industrial Sales Co., First Akron Bldg., 611 W. Market St., Akron 3, Ohio.

COE JOINS HUCK AS SALES ENGINEER

Appointment of Gerald B. Coe as engineering representative has been announced by Mr. George Q. Mathews, vice president—sales for Huck Mfg. Co., Detroit, Mich. Coe will provide sales engineering assistance in eastern Ohio and western Pennsylvania. He carries to his new job more than 10 years of sales experience, including three years as a sales engineer in the industrial fastener field.

Stop Breaking Drill Bits!

WEDGELOCK DRILL STOP



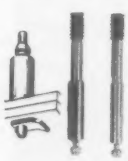
1. Increases life of drill bits
2. Regulates depth of drill hole
3. Cushions the "breakthrough"
4. Prevents chuck from marring surfaces

The Wedgelock Drill Stop consists of two steel end pieces connected by a coil spring. Slips over standard size drills from #50 to 5/16" dia., and is adjusted for required depth simply by tightening set screw. Special sizes available on request.

Wedgelock Clamps and Fasteners

Sheet Metal Clamps
Sets and releases with one hand in one operation. Many styles.

Edgelock Fasteners
Spring actuated. Powerful. Applied with pneumatic or hand pliers.



Speed Bolt Fasteners
Wide variety of holding pins to fit one standard body. Holds up to 250 lbs.

Wing Nut Fasteners
Handles thicknesses up to 2½". Adjustable pressure. Many sizes.

Spring-Actuated Fasteners
Fast alignment of rivet and bolt for lighter materials. Applied with pliers.

Wedgelock makes the greatest variety of fast-action clamps and fasteners in the country. For information on these and other Wedgelock products write—

WEDGELOCK CORPORATION
5446 Satsuma Avenue
North Hollywood, Calif.

Use postpaid card. Circle No. 239

KAHLE COMPLETES MOVE TO NEW PLANT

A move to new and enlarged plant quarters in Union City, N.J. was announced as completed by the Kahle Engineering Co., designers and builders of machinery for the electronic and glass working industries.

GARDNER-DENVER NAMES METALLURGIST

Floyd R. Anderson, administrative assistant of the Denver division of Gardner-Denver Co., Quincy, Ill., has been named chief metallurgist of the firm. He will supervise metallurgical operations of all divisions of Gardner-Denver, both domestic and foreign.

Anderson started his career with the Denver Rock Drill Manufacturing Company in 1925 as a laboratory assistant. Denver Rock Drill merged with the Gardner-Governor Co., Quincy, Ill., in 1927, to become Gardner-Denver Co. which is celebrating its Centennial in 1959.

Anderson was a metallographist for Colorado Fuel and Iron Co. from 1931 to 1934, when he returned to Gardner-Denver as an assistant metallurgist. He was named to head the department in 1937.

FASTENER INSTITUTE GROUP TOURS J & L

Approximately 30 members of the Associate Executive Group of the Industrial Fasteners Institute toured portions of the Aliquippa Works of Jones & Laughlin Steel Corp. on February 17.

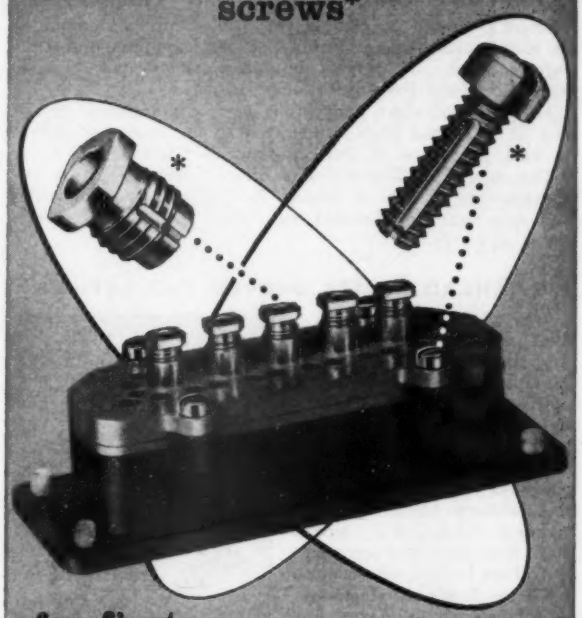
The tour was held as a part of the Institute's two-day February meeting in the Penn Sheraton Hotel, Pittsburgh. The group visited the Basic Oxygen Furnaces and the Rod and Wire Department in J&L's Aliquippa Works.

Four J&L employees were guest speakers for the group

SPECIAL RIVETS
like some of the samples shown here . . . or the more commonly used tubular and split rivets . . . they're all alike to the American Rivet Co. And always—our own special brand of quality and service that gets you what you want when you want it.
THE AMERICAN RIVET CO., Inc.
849 N. Kedzie Ave., Chicago 51, Ill.
Write for price list. For specials, send specifications for prices.
AMERICAN RIVETS
BUY AMERICAN Tubular and Split RIVETS

Use postpaid card. Circle No. 240

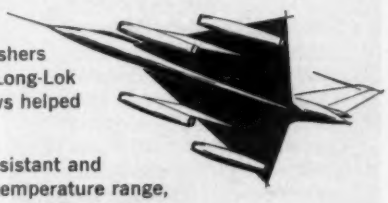
CANNON selects
LONG-LOK self-locking
screws*



for first
all-magnesium
environmental
connector.

USED ON CONVAIR'S B-58
SUPERSONIC "HUSTLER"

Two of the prime requirements of this Cannon Electric connector were that it be lightweight and fully environmental.



Because they eliminate lock washers and safety wire, Long-Lok Self-locking Screws helped save weight.

Being vibration-resistant and spanning a wide temperature range, Long-Lok Self-locking Screws solved two important environmental requirements.

Whether you have critical or normal fastener problems, Long-Lok Self-locking Screws can speed and improve your assembly operations. Available for both aircraft and commercial applications.

Write for free Bulletin LL-58.

LONG-LOK
CORPORATION

2601 COLORADO AVENUE • SANTA MONICA, CALIFORNIA

Use postpaid card. Circle No. 241

in Pittsburgh on February 16. They included L. W. French, basic oxygen furnace metallurgical investigator; George A. Sweitzer, supervisor of metallurgical investigations, rod & wire department; Clyde O. Byers, industrial engineer; and John E. Beck, assistant manager, wire products division.

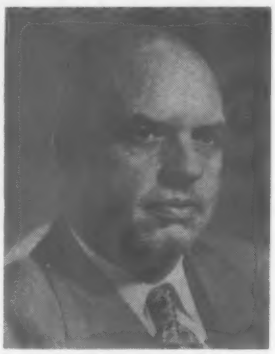
CLEVELAND CAP EXPANDS WAREHOUSING

The Cleveland Cap Screw Co., Cleveland, has expanded its warehousing operations in both Philadelphia and Chicago—in each city moving to new quarters with roughly three times the space previously occupied.

The shift to larger quarters is part of a planned expansion of sales and distribution tied to the company's move in 1956 to a new $5-million plant in Cleveland.

The new Philadelphia sales office continues under the managership of John J. Deasy. In Chicago, the new office and warehouse is directed by Frank P. Blonska, central states sales manager.

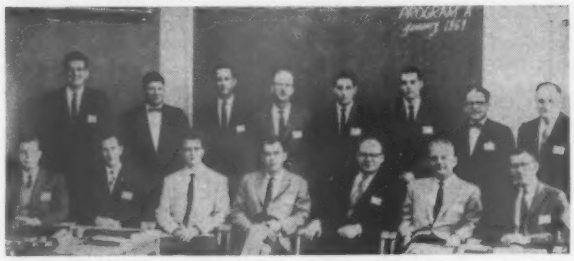
WHITEHEAD NAMES GROVER TOP OFFICER



Clayton D. Grover, president of Whitehead Metals, Inc., New York City, since 1954, has been elected chief officer. Thomas M. Bohen has been elected honorary chairman of the board of directors.

Grover has been with firm a subsidiary of The International Nickel Co., since 1925. New technical manager is Gilbert L. Cox, who comes from the Inco's development and research division in Rochester, N.Y. Cox has with Inco since 1931.

SPS GRADUATES FASTENER CLASS



Fifteen distributors and inside salesmen were graduated in January from a three-day fastener training course, conducted by Standard Pressed Steel Co., Jenkintown, Pa., in the design, manufacture and use of threaded fasteners. Standing, left to right, are: Ralph R. Rassmann, sales manager, Atlas Bolt & Supply Co., Los Angeles, Calif.; Milton E. Cotaya, salesman, Gulf States Screw Products, New Orleans, La.; Cecil O. Birkes, salesman, Wessendorff-Nelms Co., Houston, Texas; August J. Behrens, salesman, Guarantee Specialty Co., New York, N.Y.; John E. Schneider, salesman, Conway Calligan Corp., Hammond, Ind.; Terry A. Hesser, Charles A. Boyd, SPS; Gerald C. Larkin, of SPS subsidiary, Columbia Steel Equipment Co., Fort Washington, Pa.

Seated are: Stanley C. Holty, president of Atlas Bolt & Supply Co.; Richard R. Dewey, buyer, Globe Aviation Supply Co., North Hollywood, Calif.; Frank P. Griffin, Jr., salesman, Gulf States Screw Products Co.; Don R. Wroten salesman, Wessendorff-Nelms & Co., Inc.; Kenneth K. Kegerreis, sales and sales promotion, C. S. Kegerreis Supply Inc., Elkhart, Ind.; Fred G. Allen, manager, Laurel Machine & Foundry Co., Laurel, Miss.; Elliston M. Slemmer, salesman, Quad Tool & Die Supply Co., Merchantville, N.J.

YOUR INTRODUCTION TO A SPECIALIST IN STAINLESS STEEL FASTENERS . . .

We, at Allmetal, offer immediate delivery for your Stainless Steel Fastener needs.

Thirty years of "Know How" specializing in the manufacturing of Stainless Steel Fasteners is the best answer to your fastener problems. We are constantly alerted to maintain the type and quality of Stainless Steel Fasteners you require for production. Do not hesitate to inform us as to your full requirements.

Write on your company letterhead for latest catalog. This too, automatically places you on our mailing list.

STAINLESS FASTENERS
ALLMETAL
SCREW PRODUCTS COMPANY, INC.
MANUFACTURERS OF STAINLESS STEEL FASTENERS
821 STEWART AVE. • GARDEN CITY • LONG ISLAND, N.Y.
TWX GC-603 N. Y.
PHONE: PIONEER 1-1200
MIDWEST DIVISION
6424 WEST BELMONT AVE. • CHICAGO 34, ILLINOIS
TWX CG 3185
PHONE: AVENUE 2-3232, 3, 4
WEST COAST DIVISION
5822 WEST WASHINGTON BLVD. • CULVER CITY, CALIF.
TWX LA 1472
PHONE: WEBSTER 3-9595

ALLMETAL

Use postpaid card. Circle No. 242

MARCH-APRIL MEETINGS OF ASME

March and April meetings and conferences sponsored by The American Society of Mechanical Engineers are highlighted by the Nuclear Congress April 5-10 in Cleveland, Ohio.

Other sessions are: Aviation Division, Los Angeles, Mar. 9-12; Textile Engineering, Clemson, S.C., Mar. 12-13; Instruments and Regulators Division, Cleveland, Mar. 29—Apr. 2; Railroad, Chicago, Apr. 8-9; Hydraulic Division, Ann Arbor, Mich., Apr. 13-15; Oil & Gas Power Division, Houston, Tex., Apr. 19-23; Management, New York, Apr. 23-24, Metals Engineering Division, Albany, N.Y., Apr. 29—May 3.

ALCOA WELDING-BRAZING-SOLDERING MGR.

Appointment of George R. Gent to the newly created post of manager of welding, brazing, and soldering product sales, was announced today by Aluminum Company of America.

Mr. Gent joined Alcoa in 1946 as a salesman in the company's York (Pa.) sales office. Since 1953, he has served as assistant to Alcoa's manager of wire, rod, and bar sales.

A native of Toledo, Ohio, he studied mechanical engineering at Michigan State University. He is a member of the American Welding Society.

PARKER SEAL ADDS DISTRIBUTOR

The Parker Seal Co., Culver City, Calif., a division of Parker-Hannifin Corp., has added the Robert B. Porter Co., Glendale, Calif., as a distributor of industrial Stat-O-Seals

LOWEST COST THREAD ROLLER

SHUSTER, the oldest name in wire straightening and cutting, introduces a *new* Thread Roller at far less initial investment. Brings thread rolling well within range of the small to medium producer.

check these specs:

- reciprocating die type
- manual or hopper feed
- 3/32" to 5/16" dia. thread, ferrous
- 2" or 3" max. lengths
- 60 to 120 pcs p.m.
- electric controls
- 3 HP motor or U.S. Varidrive
- 4 Models

Let us quote you! Prompt delivery.

METTLER MACHINE TOOL, INC.
475 Boulevard, New Haven, Connecticut

Use postpaid card. Circle No. 243

an ACCURATE SPECIALTY!

WELDING SCREWS

We manufacture a complete line of projection welding fasteners from either Special analysis low carbon steel or stainless steel.

When it comes to welding screws, spotwelding screws and welding pins, send us your requirements . . . they are an ACCURATE SPECIALTY!

KNOW YOUR SOURCE . . . make sure it's ACCURATE! We are manufacturers of a complete line of standard and special metal fasteners . . . screws . . . nuts . . . bolts . . . washers . . . rivets . . . one source for all of YOUR fastener requirements. Our high speed production facilities enable us to serve you better, competitively priced . . . with an inventory available for delivery from stock.

WRITE NOW . . . an "ACCURATE" sales engineer is in your area, ready to serve you.

Have you received our NEW product brochure?

ACCURATE Threaded FASTENERS, Inc.

MANUFACTURERS OF STANDARDS AND SPECIALS

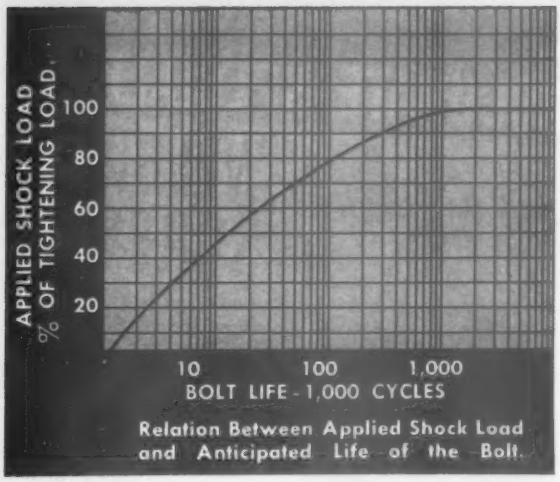
SCREWS NUTS BOLTS WASHERS RIVETS

2901 WEST MONTROSE AVENUE

CHICAGO 18 • ILLINOIS

Telephone JUniper 8-4435

Use postpaid card. Circle No. 244



Relation Between Applied Shock Load and Anticipated Life of the Bolt.

factor to be considered, in application of finished hexagon nuts...

Figure 3, page 6 in the Engineering Section of our catalog, "Relation Between Applied Shock Load and the Anticipated Life of the Bolt," is just one of the several factors that are discussed, on pages 3, 4, 5 and 6, in the application of finished hexagon nuts, where highly stressed bolts of special material are required . . . Fourteen topics, concerning the technique in the manufacture and proper installation of our product are covered in this twenty-four page brochure—requests for this literature will be handled promptly . . . . . .

*Manufacturer of Standard and Special *12 Pointer, Square and Hexagon Nuts . . . "Huglock" and "Conelock" locknuts.*

NATIONAL MACHINE PRODUCTS COMPANY

an SPS company 44250 UTICA ROAD UTICA, MICH

Use postpaid card. Circle No. 245

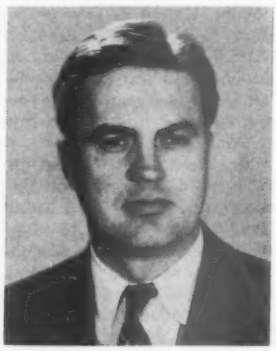
and Gask-O-Seals. A Northern California division at Hayward Municipal Airport, Hayward, Calif., will serve the Bay Area.

AIRTEK ACQUIRES RESEARCH WELDING CO.

Airtek Dynamics, Inc., of Los Angeles, Calif., announced the acquisition of Research Welding & Engineering Co., Compton, Calif. The merger is designed to better serve airframe, missile and power plant manufacturers.

CHANCE-VOUGHT APPOINTS TOP ENGINEER

Lyman C. Josephs III, project engineer for the F8U-1 Crusader while that airplane was under initial development, has been promoted to the position of chief engineer—aircraft, J. R. Clark, director of engineering for Chance Vought Aircraft, Inc., Dallas, Tex., announced today.



During Josephs' tenure as project engineer for the F8U-1, a major technological breakthrough was achieved with the Crusader's unique two-position wing, permitting the airplane to operate at speeds of more than 1000 miles an hour, yet slow down enough to land aboard an aircraft carrier.

PROMOTION AT PAGE STEEL AND WIRE

T. P. Bronco has been appointed to the position of assistant to the general manager-sales at the Page Steel and Wire Div., American Chain & Cable Co., Inc., Monessen, Pennsylvania.

CRT * *High Tensile* **ALLOY STEEL STUDS**

ALLOY, STAINLESS AND NON-FERROUS PRODUCTS FOR REFINERIES, CHEMICAL PLANTS, UTILITIES AND GENERAL INDUSTRIES

"Lok-Thred" Licensee

SINTZ "CRT" threaded steel and non ferrous rod • COLD ROLLED THREADED—HEADS COLD • QUALITY • SERVICE • PRICE Established 1912

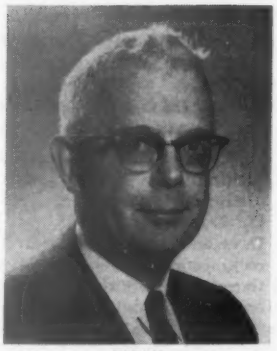
CLAUDE SINTZ INC. 1928-40 STANLEY AVENUE DETROIT 8, MICHIGAN

Use postpaid card. Circle No. 246

KEY SALES CHANGES AT REPUBLIC DIV.

WAGNER

FRAZIER



LYONS

Three top appointments in the Bolt and Nut Sales Div. of Republic Steel Corp., Cleveland, Ohio, were announced today by Jack D. Cavan, general manager of sales of the division.

Richard E. Wagner, formerly the division's Cleveland district sales manager, has been appointed assistant general manager of sales. Justin W. Lyons, who has been a divisional sales engineer, was promoted to manager of automotive sales. He also retains responsibilty for sales of Nylok and related fastener products. Harry E. Frazier was named manager of sales of consumer products. He will continue as mana-

AUTOMOTIVE and AIRCRAFT QUALITY screw machine parts with "LOK-THRED"

"LOK-THRED" is self-locking, stronger, non-fretting, self-sealing and economical. Actually improves in service.

We specialize in difficult and complicated screw machine parts. High accuracy prototypes to multimillion production runs. All standard steels, non-ferrous metals or modern aircraft engine metals. Hardened and ground. Complete, modern equipment. Cooperative development engineering service.

Let us demonstrate the many advantages of "LOK-THRED". PHONE PRescott 5-6262.

MAYNARD MANUFACTURING CO.
22755 SHAKESPEARE, EAST DETROIT, MICH.

Use postpaid card. Circle No .247

now-

SHEAR-PROOF ALLOY STEEL

DRIV-LOK PINS *for maximum resistance to*

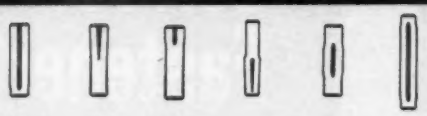
shear *shock* *fatigue*

- Drill a hole and drive them in . . . they're grooved and self-locking
- Provide the ultimate in physical properties at moderate cost
- Re-usable without loss of holding power

Now, you can get the efficiency, convenience and proven economy of DRIV-LOK Grooved Pins PLUS maximum resistance to shear, shock and fatigue, by specifying or installing *Shear-Proof* DRIV-LOK Pins. Made of alloy steel, heat treated to provide optimum physical properties and high shear values, Shear-Proof DRIV-LOK Pins are designed for critical applications where ultimate strength and reliability are mandatory. They are replacing alloy dowels, bolts, key and set screw assemblies, hollow pins (used singly, or one inside the other) in widely varied applications . . . thus saving time, labor and material. Write for special Shear-Proof DRIV-LOK Pin Catalog. Sample Type A Shear-Proof Pins furnished free on request.

type A standard

SPECIAL TYPES TO ORDER . . .



A3 B C D E U

COMPARE TYPICAL SHEAR VALUES (Minimum double shear strength in pounds)	Diameter	Slotted Spring Pins	Coiled Spring Pins HEAVY DUTY	SHEAR-PROOF DRIV-LOK PINS
	3/32	1000	1030	2040
	1/8	2100	1840	3690
	5/32	3000	2880	5720
	3/16	4400	4140	8240
	1/4	7700	7360	14720
	5/16	11500	11500	22960
	3/8	17600	16580	33160
	7/16	20000	22540	45000
	1/2	25800	29440	58900

DRIV-LOK SALES CORPORATION
731 PARK AVENUE • SYCAMORE, ILLINOIS

Use postpaid card. Circle No. 248

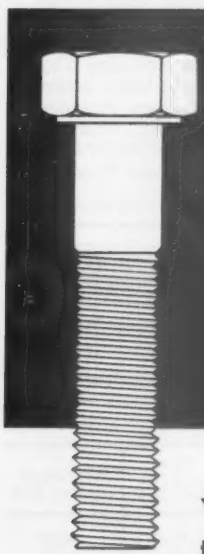
STOP "FUMBLEITIS" WITH

Magna-tip® MAGNETIC SCREW DRIVING ACCESSORIES

Magna (magnetic) bit holders, finders and sockets for all power screwdrivers, eliminate "fumbleitis" by firmly holding screws, bolts or nuts in assembly operations. Proven in use in hundreds of plants, Magna-Tip accessories can help push your production up and costs down. Ask your power screwdriver salesman to show you these handy Magna accessories.

WRITE *for manual on the complete line of Magna-Tip bit holders, finders, sockets and hand screwdrivers:* Dept. 95G1, *Magna Driver Corp.,* 779 *Washington St., Buffalo* 3, *N.Y.*

Use postpaid card. Circle No. 249



Using The Correct Fastener?

You can solve this problem.

Write for free data on torque/tension relationships.

SKIDMORE-WILHELM
Manufacturing Company
444 S. GREEN ROAD CLEVELAND, OHIO

Use postpaid card. Circle No. 250

ger of the tool steel department. Wagner started with the Bolt and Nut division in 1935 and began specializing in fastener sales in 1949. In 1955 he became Cleveland district sales supervisor and, in 1956, district sales manager.

ROFHEART TO PROMOTE P-K SALES

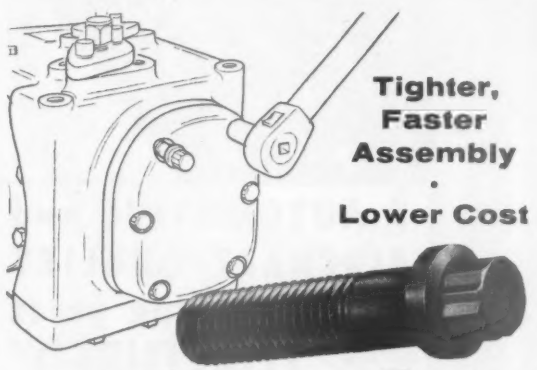
The appointment of Arnold D. Rofheart as sales promotion manager was announced by Parker-Kalon Div., General American Transportation Corp., Clifton, N.J. fastener manufacturer. Rofheart has been with Parker-Kalon since 1949, and was named assistant sales promotion manager in 1957. He is a member of the New Jersey Chapter of the National Industrial Advertisers Association.

SPS PREDICTS 2000°F FASTENERS IN 1959

Aircraft bolts for hot-spot applications at 1800 and even 2000°F—a significant advance of 200 to 400° in operating temperatures——are among major fastener developments predicted by Standard Pressed Steel Co., Jenkintown, Pa., for 1959.

Developed from the refractory metals molybdenum and columbium, the elevated temperature fasteners should pave the way for hotter fuels and higher-efficiency jet engines and rocket motors.

Steel fasteners with 300,000 lbs. psi tensile strength; remarkably lightweight beryllium bolts; and titanium-alloy fasteners which are 20% stronger than present bolts are other aircraft-and-missile area improvements which can be expected in the year ahead, according to Robert L. Sproat, chief metallurgist.



Tighter, Faster Assembly • Lower Cost

with **countr-bor**® **Screws**

Tighter wrenching. No special tools needed. Fits flush in standard counterbored holes. Improves product appearance.

Save up to 20% on the screws alone and get greater holding strength.

Send for literature and samples of the sizes you wish to try.

FERRY CAP & Set Screw Company
2195 Scranton Road • Cleveland 13, Ohio

Use postpaid card. Circle No. 251

SOLAR EXPANDS BRAZING FACILITIES

Solar Aircraft Company is ordering a huge new brazing furnace for the brazing of large panels of all-metal honeycomb sandwich. This facility is in addition to the recently announced underground furnace now being constructed at Solar for brazing and heat treating.

The brazing furnace is one phase of a major expansion of Solar's facilities in Des Moines, Ia., for the manufacture of brazed honeycomb sandwich material, said W. G. Dollmeyer, vice president-operations.

The new brazing furnace will be electronically controlled and capable of handling honeycomb panels up to approximately 8 x 14 feet.

Solar is also building two additional core-making machines of an advanced design, Dollmeyer said. The machines, developed by Solar, form the complex honeycomb internal structure from metal strips that range down to .001 in. in thickness.

MAHON SPECIALIST LECTURES ON WELDING

J. R. Stitt, research and welding engineer for The R. C. Mahon Co., Detroit was selected as one of the nation's top 10 welding experts from private industry to deliver two lectures in February, before supervisors and management of the United States Naval Gun Factory, Washington, D.C.

He discussed problems of setting up arc welding specifications, and duties of welding inspectors, before 300 of the gun factories key personnel.

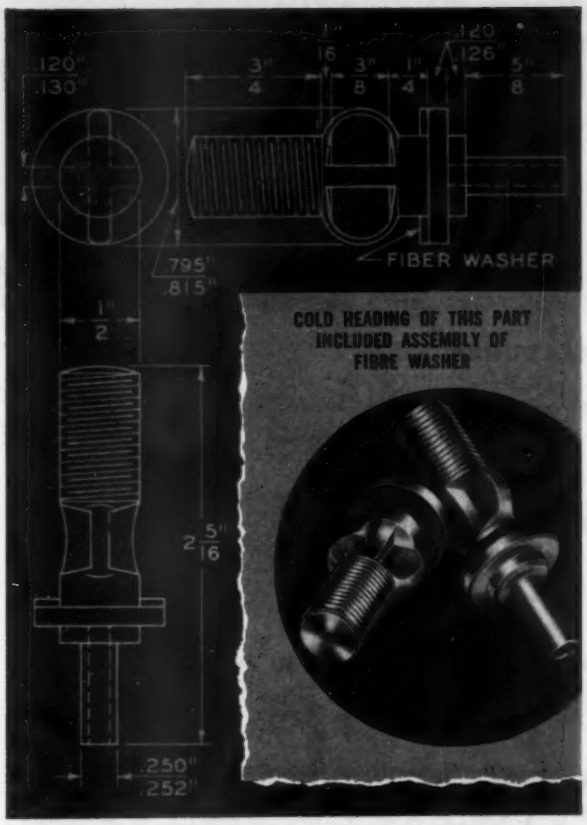
NEW DISTRIBUTOR FOR TINNERMAN

George A. Tinnerman, developer and patentee of construction fasteners used to secure and suspend different types of service equipment, ceilings, ductwork, has licensed Erico Products, Inc., Cleveland, Ohio, as the exclusive distributor of these products in the construction market. Clarke Tryon & Associates is merging its activities with those of Erico Products where it will function as the Fastener Products Division.

Use postpaid card. Circle No. 252

BOLTS 'N NUTS FROM REPUBLIC
"I COOK, SEW, SWEEP FLOORS, MAKE BEDS--AND WHAT DO YOU DO ALL DAY? BUY A FEW LITTLE NUTS AND BOLTS, THAT'S ALL."
Adv. Republic Steel

Use postpaid card. Circle No. 253



smartly designed part saved

by cold heading

Functionally the design of the above part was ideal. But its six different diameters and the need to pre-assemble a fibre washer posed production difficulties. Making it by conventional machining methods would price it out of reach. It looked too complex for cold heading.

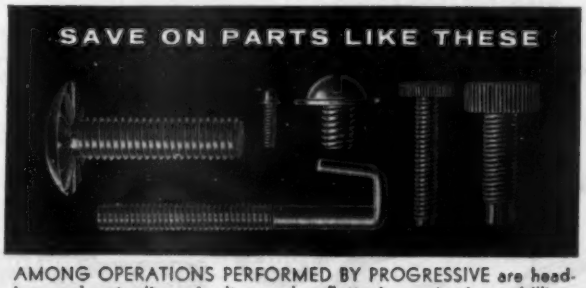
But Progressive did it. We can apply cold heading to components normally considered as machining jobs, which would naturally cost more. You, too, can save money on difficult parts. For more case histories, write for our *"Bank Book of Savings in Cold Heading."*

MACHINE SCREWS AND NUTS, SEMS FASTENERS,
SLOTTED TAPPING SCREWS AND PHILLIPS HEAD SCREWS

THE PROGRESSIVE MFG. CO.

Division of The Torrington Company

40 Norwood St., Torrington, Connecticut



AMONG OPERATIONS PERFORMED BY PROGRESSIVE are heading and extruding simultaneously; flattening; piercing; drilling; bending; pointing; fluted or diamond knurling; trimming; turning tenons, shoulders or recesses; struck or sawed slotting; notching.

Use postpaid card. Circle No. 254

CONTENTS IN THIS ISSUE

Don't overlook these articles

FEATURES

22—Bonding of Helicopter Blades

Parsons builds up laminations for the root-end of rotor blades by adhesive bonding.

26—How to Determine Torque-Tension Relationships

Dual-function instruments can accurately determine tensile strength of threaded fasteners.

30—Assembly of Electronic Products

How assembly problems peculiar to precision, electronic products are minimized at LearCal.

35—Special Fixtures Aid Camera Assembly at Ansco

Sliding fixtures help set both rivet-nuts and rivets in their Clipper model.

ASSEMBLY IDEAS

15—Holding Fixture for Stud Setting

Brown-Lipe-Chapin uses special fixtures to speed hole tapping in automotive zinc alloy castings.

16—Assembly Machine Sets Exact Torque Automatically

Air is used as force to bring an aircraft subassembly to its final required torque.

REPORTS FROM THE FIELD

19—Mahon Develops Integrated Line for Bridge Weldments

Large structural steel girders are arc-welded on a production-line basis.

21—Bonding Irregularly-Shaped Parts

New adhesive joining technique, called "ball bonding", has been developed by Twin Coach.

DISTRICT MANAGERS • Assembly and Fastener Engineering

EASTERN DIVISION

Dan E. Reardon, V.P. in charge
c/o Hitchcock Publishing Co.
55 West 42nd Street
New York 36, N.Y.
Telephone: LAckawanna 4-4528
Home Address: Box 1,
South Glastonbury, Conn.
Home Telephone: MEdford 3-7083

NEW ENGLAND
John Pickering Jr.
c/o Hitchcock Publishing Co.
Box No. 29, Andover, Mass.
Telephone: GReenleaf 5-0499

NEW YORK, METROPOLITAN AREA, EASTERN PENNA., CENTRAL N. Y. STATE, N. J. MD., DELA., D. of C.
Ralph Payne
c/o Hitchcock Publishing Co.
55 West 42nd Street
New York 36, N.Y.
Telephone: LAckawanna 4-4528

CENTRAL DIVISION

NORTHEASTERN ILLINOIS, WESTERN MICHIGAN
Henry J. Smith, V.P. in charge
c/o Hitchcock Publishing Co.
Wheaton, Illinois
Telephone: MOntrose 5-1000

NORTHERN INDIANA and EASTERN MICHIGAN
William E. Jacobs
c/o Hitchcock Publishing Co.
18055 James Couzens Highway
Detroit 35, Michigan
Telephone: DIamond 1-9525

WESTERN NEW YORK STATE, WESTERN PENNSYLVANIA, NORTHEASTERN OHIO
Ralph E. Helfrick
1507 Edgefield Avenue
Cleveland 24, Ohio
Telephone: HIlicrest 2-0189

SOUTHERN ILLINOIS, UPPER PENINSULA MICHIGAN, MINNESOTA, MISSOURI, SOUTH DAKOTA and WISCONSIN
Robert M. Prymuski
c/o Hitchcock Publishing Co.
Wheaton, Illinois
Telephone: MOntrose 5-1000

OHIO, SOUTHERN INDIANA and KENTUCKY
James C. Stewart
c/o Hitchcock Publishing Company
Wheaton, Illinois
Telephone: MOntrose 5-1000

WESTERN DIVISION

CALIFORNIA, ARIZONA
Keith H. Evans
3723 Wilshire Boulevard
Los Angeles 5, California
Telephone: DUnkirk 8-2981
and
Room 225—515 Market St. Bldg.
San Francisco 5, California
Telephone: YUkon 2-4280

OREGON, WASHINGTON
Lloyd Thorpe
212 General Insurance Building
Seattle 5, Washington
Phone: MElrose 3-4242

Use postpaid card. Circle No. 256

INDEX TO ADVERTISERS

A

ACCURATE THREADED FASTENERS, INC. 65
ALLEN MANUFACTURING COMPANY 45
ALLMETAL SCREW PRODUCTS COMPANY, INC. 64
AMERICAN RIVET COMPANY 63
AMERICAN SCREW COMPANY 16
AMERICAN SCREW COMPANY 20
AMERICAN SEALANTS COMPANY 44
ANCHOR FASTENERS, INC. 54

B

BARWOOD MFG. COMPANY, INC., L. J. 12
BOOTS AIRCRAFT NUT CORPORATION 69
BRISTOL COMPANY, THE 37
BUFFALO BOLT COMPANY 2

C

CAMLOC FASTENER CORPORATION 34

D

DETROIT POWER SCREWDRIVER COMPANY 13
DIXON AUTOMATIC TOOL, INC. 21
DRIV-LOK SALES CORPORATION 67

E

EASTERN MACHINE SCREW CORPORATION 48
ELASTIC STOP NUT CORPORATION OF AMERICA 10
ELCO TOOL & SCREW CORPORATION 36

F

FERRY CAP & SET SCREW COMPANY, THE 68

G

GARDNER-DENVER COMPANY 38
GENERAL AMERICAN TRANSPORTATION CORPORATION (PARKER-KALON DIVISION) 14
GRIES REPRODUCER CORPORATION 52

H

HARPER COMPANY, H. M. 47
HASSALL, INC., JOHN 59
HELI-COIL CORPORATION 17
HOLO-KROME SCREW CORPORATION, THE 18
HUBBELL, INC., HARVEY 46
HUNTER TOOLS 70

I

INDUSTRIAL RETAINING RING COMPANY 58
INGERSOLL-RAND CORPORATION 9

L

LAMSON & SESSIONS COMPANY, THE 4
LONG-LOK CORPORATION 63

M

MAC-IT PARTS COMPANY 55
MACLEAN-FOGG LOCK NUT COMPANY 41
MAGNA-DRIVER CORPORATION 68
MAYNARD MANUFACTURING COMPANY 67
METTLER MACHINE TOOL, INC. 65
MILFORD RIVET & MACHINE COMPANY, THE 29

N

NATIONAL LOCK COMPANY 28
NATIONAL MACHINE PRODUCTS COMPANY (AN SPS COMPANY) 66

P

PARKER-KALON DIVISION (GENERAL AMERICAN TRANSPORTATION CORPORATION) 14
PHEOLL MANUFACTURING COMPANY 2nd COVER
PROGRESSIVE MANUFACTURING COMPANY, (DIVISION OF THE TORRINGTON COMPANY) 69

R

REPUBLIC STEEL CORPORATION 69
ROCKFORD SCREW PRODUCTS COMPANY 32 A-F
ROSAN, INC. 3

S

SCOVILL INDUSTRIAL FASTENERS SALES (WATERVILLE DIVISION) 50
SCREW RESEARCH ASSOCIATION 42
SIMMONS FASTENER CORPORATION 36
SINTZ, INC., CLAUDE 66
SKIDMORE-WILHELM MANUFACTURING COMPANY 68
SNAP-ON TOOLS CORPORATION 53
SOUTHERN SCREW COMPANY 4th COVER
STANDARD PRESSED STEEL COMPANY (AN SPS COMPANY) 3rd COVER
STIMPSON COMPANY, EDWIN B. 49
STURTEVANT COMPANY, P. A. 52

T

TINNERMAN PRODUCTS, INC. 6
TORRINGTON COMPANY, THE (THE PROGRESSIVE MFG. COMPANY DIVISION) 69

W

WALDES-KOHINOOR, INC. 60
WATERVILLE DIVISION (SCOVILL INDUSTRIAL FASTENERS SALES) 50
WEDGELOCK CORPORATION 62

ONE LAST WORD

THE STRYCHNINE AND POTASSIUM CYANIDE OF BUSINESS

You can hold it in your hand and buy thousands of them for pennies, and if you're a poet you can glow with golden thoughts over the engineering principle and beauty of the lowly screw.

Is it trivial? Not when the engine is attached to the aircraft wing with but three bolts. Insignificant? Not when one lost screw transforms your car into immobile, useless metal. Unimportant? When a multi-million dollar missile and this country's defense swish by on a few thin threads, there's more of importance here than poetry. Truly, the world is held together by threads!

We realize the screw's importance, you say, and we don't slight it, but there's no need to club us to death with fancy words about it. Possibly you're right, maybe all of us are too busy to dream about the philosophy of the lowly fastener. Instead, let's be crassly commercial. American industry spends 50 to 75% of its manufacturing cost on fastening and assembling its products. The annual service bill in this country is a juicy 25 billion per year, and rising. High cost of manufacture and unreliable products are the strychnine and potassium cyanide of any business.

The imagination and thinking of our very best engineering brains are needed most desperately in the field of assembly and fastening. This is not the time for the penny pinchers and the boys who can shave-a-bit-off the price. It is the time for reliability in fasteners so that reliability may be built into the product. You can't build into a car, a washer, or a machine what isn't in the components regardless of the price.

How do you slash fastening and assembly costs?

1. Determine, at the design stage, how the product is to be assembled and fastened. Too often the fastening method is passed over lightly at the design stage resulting in exhorbitant final fastening and assembly costs.

2. Engineer the fastening method with an open mind. Examine alternates like brazing, welding, bonding, specials instead of standards, or standards instead of specials. Examine methods constantly with a view toward improving existing methods.

3. Before purchasing, reflect on the cost of assembling. The dollar you save at the point of purchase may snowball into 20 dollars at the point of assembly.

4. Consider mechanized methods of assembling. Again, return to the point of purchase and make certain that the fastening method you use will lend itself to mechanized assembling.

Nowhere in metalworking exists there such an enormous area for the exercising of imagination and the application of creative thought.

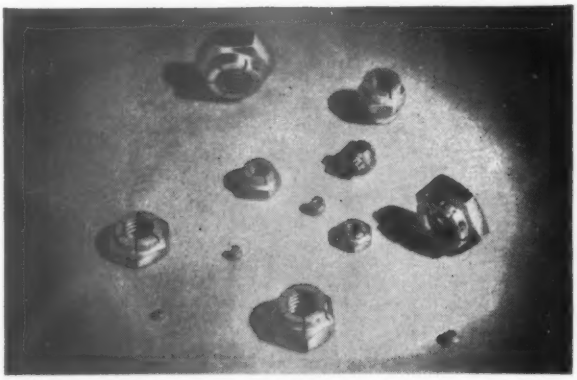
You work with a screw, a hunk of lead, a piece of glue, a glob of molten metal, or a twisted wire form. Is there not imagination here? Think of it, you can grasp in your hand the few parts which hold together our airplanes, automobiles, missiles, washers and roller skates. Trivial? Unimportant? Insignificant? Never! The wheels of the world turn on your imagination and ability.

Wm. J. Schleicher

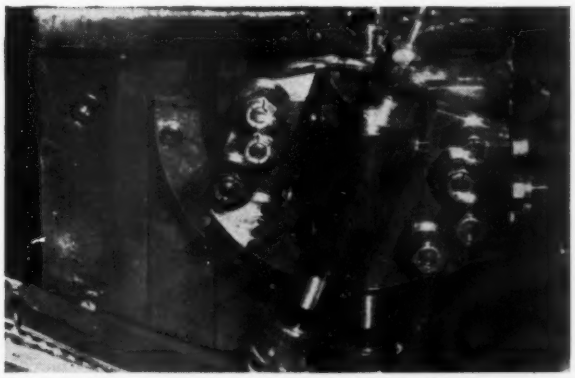
Vice President & Editorial Director

SPS RELIABILITY / *A dynamic standard of predictable performance*

There's a FLEXLOC locknut for every application need

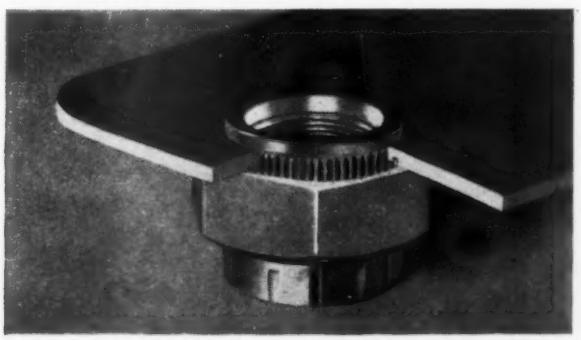


FLEXLOC self-locking nuts are available in alloy steel (plain or cadmium plated) for temperatures to 550°F.; in corrosion-resisting steel (passivated or silver plated) for temperatures to 750°F.; and in brass (plain or cadmium plated) and aluminum (plain or chemically treated) for temperatures to 250°F.



Stroboscopic photo shows application of full-height FLEXLOC locknuts on the transfer injector of a nut finishing machine. Despite constant rockerlike motion of the injector arm, FLEXLOCs do not work loose. Full-height FLEXLOCs are available in sizes #2 through 2 in.; also in microsizes #0 through #4.

FLEXLOC thin nuts are used here as stop nuts on the stamping attachment of a milling machine; resist thousands of impacts an hour. Thin FLEXLOCs are furnished in sizes #6 through 1½ in.; are designed for use where weight savings are important or where locking action is desired with shorter bolts.



FLEXLOC clinch nuts simplify fastening to sheet metal; aid in blind fastening. Clinch nuts are available in sizes #4 through 5/16 in.; also in microsizes #0 through #4. Cutaway view shows how FLEXLOC becomes an integral part of the completed assembly. FLEXLOC functions as a tapped hole—one that will lock a screw securely in place.

Wherever you have a requirement for vibration-proof nut assembly, there is a FLEXLOC self-locking nut to meet it. And FLEXLOCs are available to you locally from a single source of supply. Your SPS distributor carries them in a complete range of types, sizes, materials and finishes. This simplifies your paper work and insures prompt delivery.

FLEXLOCs are 1-piece, all-metal fasteners requiring no auxiliary locking devices—no lockwashers, jam nuts or cotter pins. There is nothing extra to put together, come apart or get lost. Thus FLEXLOCs facilitate design and save assembly time. They also save on maintenance, because they can be reused repeatedly without loss of locking reliability. See your authorized SPS distributor for complete information on FLEXLOC self-locking nuts . . . or write SPS—manufacturer of precision threaded fasteners, including titanium. Flexloc Locknut Division, STANDARD PRESSED STEEL CO., Jenkintown 78, Pa.

SPS **Jenkintown • Pennsylvania**

Standard Pressed Steel Co. • The Cleveland Cap Screw Co. • Columbia Steel Equipment Co. • National Machine Products Co. • Nutt-Shel Co. • SPS Western • Standco Canada Ltd. • Unbrako Socket Screw Co., Ltd.

Use postpaid card. Circle No. 276

IN FASTENERS SOUTHERN IS

the source

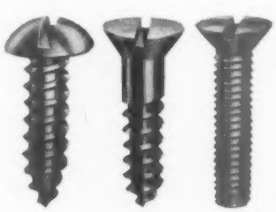
Southern has many customers who know that for every screw requirement, Southern is the source "from which all fine fasteners flow." Southern is proud of being recognized as the source for customers who order and receive screws of highest quality, on time, and at a fair price.

If you haven't tried Southern as the source for your requirements, one order will convince you that you've been missing something. Write for Southern's current Stock List. Address: Southern Screw Company, P. O. Box 1360, Statesville, North Carolina.

Manufacturing and Main Stock in Statesville, North Carolina

Warehouses: New York • Chicago • Dallas Los Angeles

Machine Screws & Nuts
Tapping Screws
Wood Screws
Stove Bolts
Carriage Bolts
Dowel Screws
Hanger Bolts
Drive Screws



Use postpaid card. Circle No. 277